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Operational Guidelines and Clinical Management of Japanese Encephalitis

National Programme for Prevention and Control of Japanese Encephalitis/ Acute Encephalitis Syndrome

DIRECTORATE OF HEALTH AND FAMILY WELFARE SERVICES
Anandarao Circle, Bengaluru – 560 009

2016

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PREFACE

Over the years, Japanese Encephalitis (J.E.) has emerged as one of the major public health problems in the country, due to its complex eco-epidemiology. Subsequent to a major outbreak of suspected Japanese Encephalitis in Eastern Uttar Pradesh during 2005, Government of India took up the initiative of introducing Japanese Encephalitis vaccine on priority in high endemic areas from 2006. The Director of National Vector Borne Disease Control Programme was vested with the responsibility of Prevention and Control of Japanese Encephalitis / Acute Encephalitis Syndrome (JE / AES) in 'programme mode' which resulted in development of technical guidelines for operationalizing programme components in 2007. The guidelines covered all the important areas of Disease Surveillance, Prevention, Control and Case Management aspects.

A major initiative of Government of India resulted in developing a unique programme seeking convergence of the Ministries like (i) Ministry of Drinking Water and Sanitation for provision of safe water supply, (ii) Ministry of Women and Child Development for providing high quality nutrition to the vulnerable children (iii) Ministry of Social Justice and Empowerment of establishing District Disability Rehabilitation Centres (iv) Ministry of Housing and Urban Poverty Alleviation for ensuring the supply of safe water in slums and towns and (v) Ministry of Human Resource. The above convergence resulted in developing National Programme for Prevention and Control of JE / AES.

Karnataka also experienced the problem of JE from 1977-78 onwards, along with other States like West Bengal, Haryana, Bihar, Uttar Pradesh, Assam, Tamil Nadu, and Andhra Pradesh.

This operational guideline is prepared on the lines of those formulated by Government of India, so as to suit the local needs of Karnataka State. I thank the Joint Director (NVBDCP), Deputy Director (NVBDCP), the Entomologists, Technical Officers and State Consultants of the Directorate of Health & FW Services, for their assistance in the preparation of this reprint. My special thanks to Dr. K. Ravi Kumar, Senior Regional Director for Health & FW, Government of India, for his valuable suggestions and efforts in bringing out this edition of Operational guidelines as well as Clinical Management aspects, for the guidance of the Medical Officers in the State.

Director of Health & FW Services
Bengaluru – 9

CONTENTS

ACUTE ENCEPHALITIS SYNDROME AND JAPANESE ENCEPHALITIS

Brief Scenario of JE & AES in the Country:

The first case of Japanese Encephalitis (JE) was reported in India in 1955 from Vellore, Tamil Nadu. The first major JE outbreak was reported in 1973 from Burdwan district of West Bengal. Since then JE/AES has been reported from 171 districts of 19 States in the country. A major outbreak of Japanese Encephalitis was reported from eastern UP during 2005 resulting in recording of more than 6000 cases and 1500 deaths. This led to a major decision of introduction of vaccine in high endemic areas. Simultaneously NVBDCP developed surveillance and case management guidelines for syndromic reporting of Acute Encephalitis Syndrome including Japanese Encephalitis. During this outbreak, NIV Pune detected entero-viral infections (22%) out of 302 CSF/sera samples through RT-PCR. At present 171 districts in 17 States are reporting JE cases out of which 60 districts in 5 States are considered as priority districts to which additional inputs are being provided by Government of India. The list of these districts are furnished at the end of Chapter 1.

KARNATAKA STATE Scenario on J.E. and AES:

The first case of Japanese Encephalitis (J.E.) reported in Karnataka dates back to 1978, from Kolar district. Subsequently the other districts like Mandya, Ballari, Raichur and some of the adjacent rice growing areas reported scattered cases of J.E. The highest deaths due to JE was reported in the State during the year 1981 with 236 deaths out of 837 cases reported in children below the age of 15 year, out of a total of 1165 deaths reported in the Country 12 endemic States.

Initially, a Tissue Culture vaccine was used in many parts of the country and also in some parts of the State, reporting high incidence/outbreak, which was imported from Japan; The vaccine was then indigenously manufactured at Central Research Institute, Kasouli. However, this had limited protection against the disease. it was also not cost effective due to the high cost of the vaccine at that time, as covering the entire population was not considered feasible.

At present the live attenuated Chinese vaccine SA-14-14-2 is widely used under Universal Immunization Programme in the State for children in endemic districts, after the completion of one round of mass vaccination in the district - on campaign mode. The incidence of JE as well as Case Fatality rate due to this disease has declined drastically in the State. The details of vaccination programme in the State is furnished in Chapter 2.

The incidence of JE cases in Karnataka from 1978 to 1987 (One decade after the reporting of first cases of JE) is as follows:

JE incidence of cases / deaths

1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
72/18	920/233	9/5	837/236	150/52	410/112	81/30	138/57	635/105	132/43

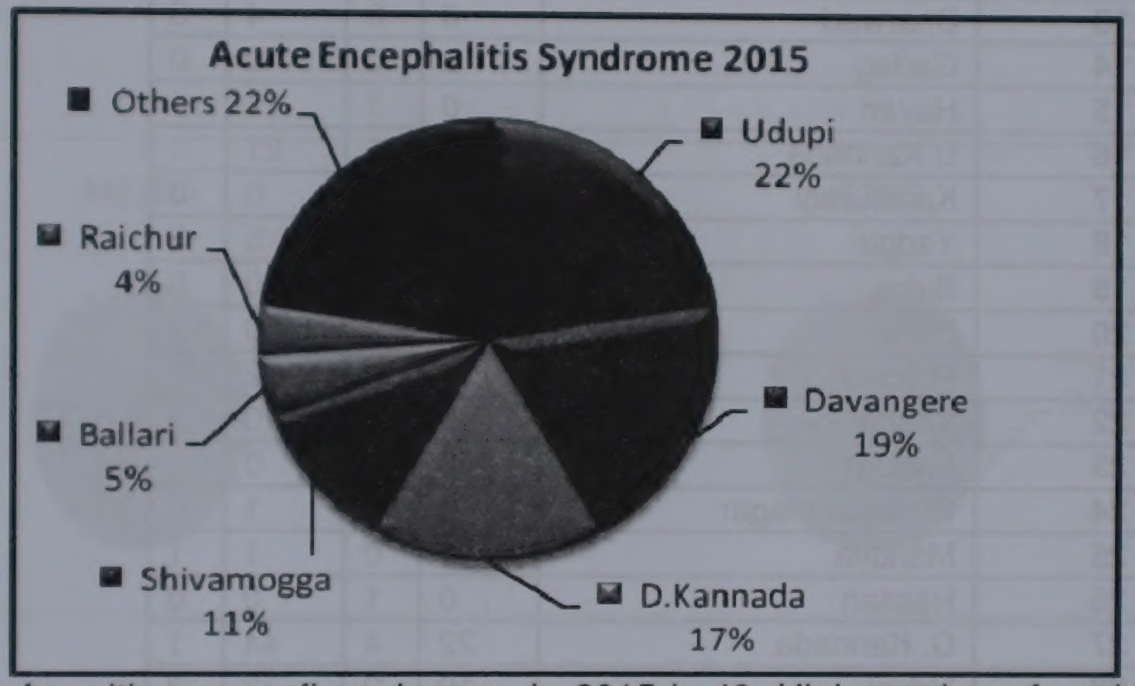
Subsequently, from 1988 the State reported the cases as under (Cases/Deaths):

1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
83/23	49/13	130/43	303/114	58/15	99/22	126/47	285/89	177/17	436/87	306/50	679/98	438/45

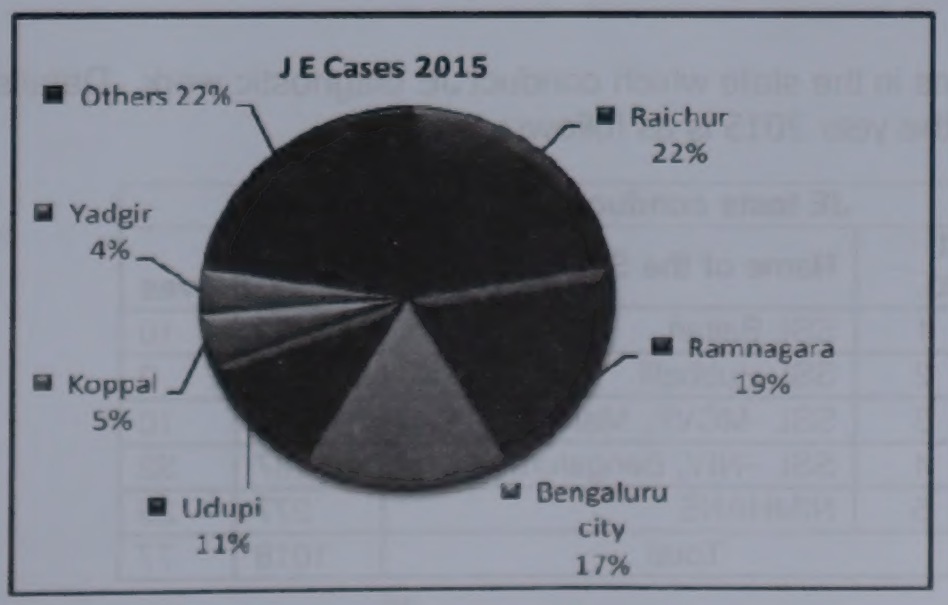
Acute Encephalitis Syndrome (AES) Surveillance was started along with the Campaign mode vaccination programmes in the State i.e. from 2006 onwards. Till then only Suspected JE cases were being reported and samples from such cases were drawn for further confirmation. The above data depicts the confirmed JE cases and confirmed JE deaths in the State.

The situation as in 2015 is as follows:

The number of AES cases in 2015 is 382. Maximum number of cases is seen in the districts Udupi (73 cases) followed by Davanagere (54 cases), D.Kannada (44 cases), Shimoga (34 cases), Bellary (30 cases), Raichur (22 cases), Uttara Kannada (21 cases) and Chitradurga (21 cases).



The number of positive or confirmed cases in 2015 is 49. High number of positives are seen in districts Raichur (12 cases), Ramanagara (5 cases), Bengaluru City (4 cases), Bangalore (U) (4 cases), Udupi, Koppal, Yadgir (3 cases each), Vijayapura, Chitradurga, Chikkaballapura (2 cases each). One death from Mandya is reported from the state.



The district wise information for 2015 is as follows:

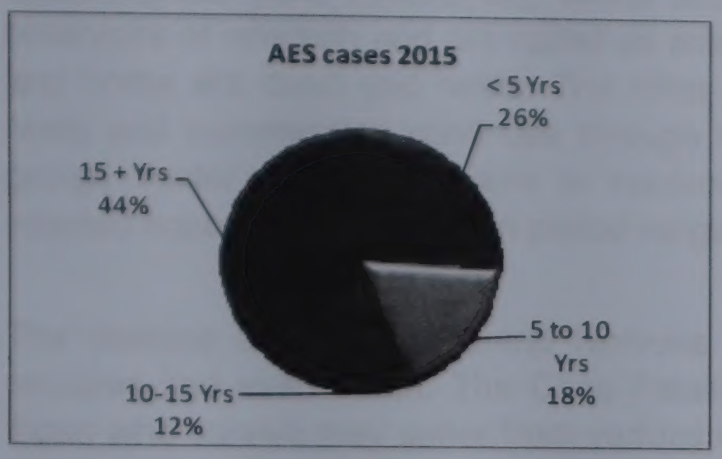
AES/JE situation in 2015					
SL. No.	District	2014		2015	
		AES	JE	AES	JE
1	Bengaluru(U)	1	3	4	4
2	Bengaluru(R)	0	0	0	0
3	Ramanagar	1	0	5	5
4	Kolar	2	0	1	1
5	Chikkaballapur	0	0	2	2
6	Tumakuru	0	1	0	0
7	Chitradurga	0	1	21	2
8	Davangere	33	3	54	0
9	Shivamogga	15	0	34	0
10	Belgavi	0	1	1	0
11	Vijayapura	1	1	5	2
12	Bagalkote	0	0	2	0
13	Dharwad	0	0	4	0
14	Gadag	0	0	0	0
15	Haveri	0	1	17	1
16	U Kannada	0	1	21	1
17	Kalaburagi	0	0	0	0
18	Yadgir	2	0	5	3
19	Bidar	0	0	0	0
20	Ballari	22	2	30	3
21	Raichur	9	4	22	12
22	Koppal	0	0	10	3
23	Mysuru	0	0	0	0
24	Chamarajnagar	0	0	1	0
25	Mandya	0	0	1	1
26	Hassan	0	1	0	0
27	D. Kannada	22	4	44	1
28	Udupi	19	9	73	3
29	Chikkamagaluru	6	2	13	1
30	Kodagu	0	0	1	0
31	Bengaluru City	0	0	11	4
	TOTAL	**133**	**34**	**382**	**49**

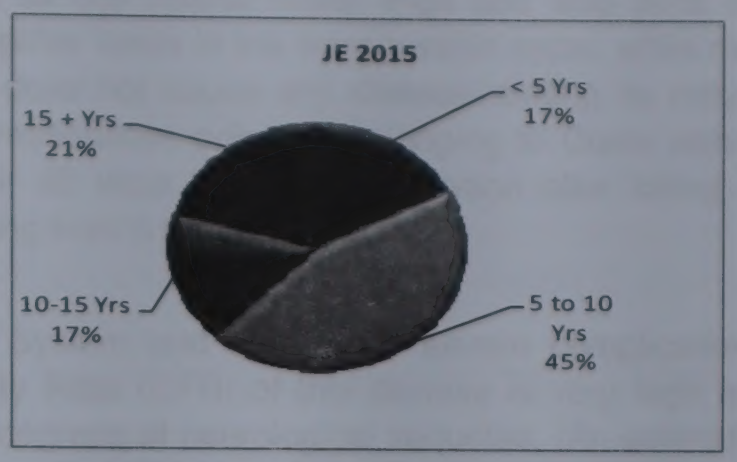
There are 5 institutions in the state which conduct JE diagnostic work. Details of JE tests done there for the year 2015 is as follows:

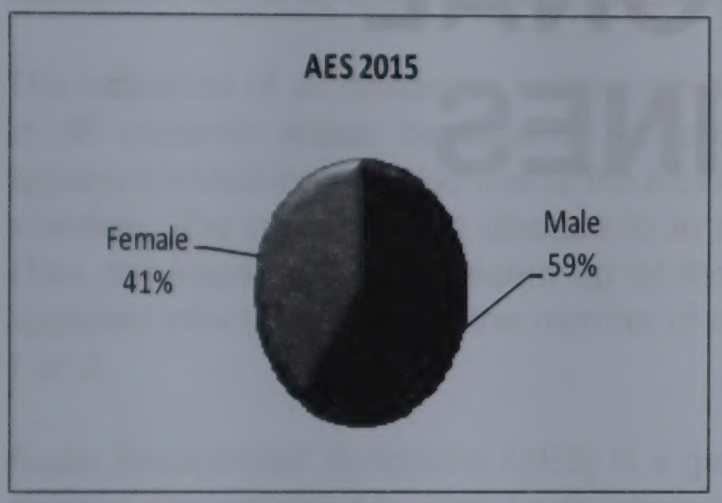
JE tests conducted at Sentinel Labs			
Sl. No.	Name of the Sentinel Lab	Tested	+ves
1	SSL Ballari	53	10
2	SSL Hubballi	4	0
3	SSL -MCVR, Manipal	397	10
4	SSL –NIV, Bengaluru	287	32
5	NIMHANS	277	25
Total		1018	77

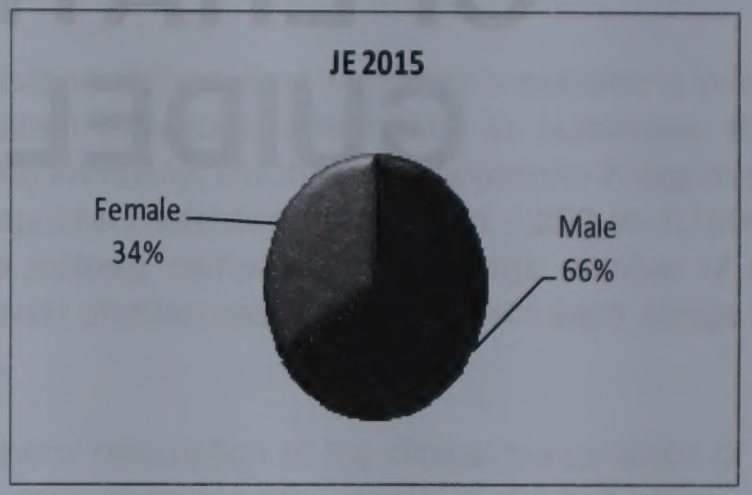
However the sentinel centres at NIMHANS, NIV and MCVR Udupi test samples from AES cases from outside the state also. 681 cases of AES and 30 cases of JE are said to be from outside the state.

The age and gender wise breakup of AES and JE cases are shown in the following graphs:









OPERATIONAL GUIDELINES

Chapter – 1

Policy and strategic framework for implementation

1.1 Introduction:

Japanese Encephalitis (JE) is a mosquito borne zoonotic viral disease. The virus is maintained in animals, birds, pigs, particularly the birds belonging to family Ardeidae (eg. Cattle egrets, pond herons etc) which act as the natural hosts. Pigs and wild birds are reservoirs of infection and are called as amplifier hosts in the transmission cycle, while man and horse are dead end hosts. The virus does not cause any disease among its natural hosts and transmission continues through mosquitoes primarily belonging to Culex vishnui group. Vector mosquito is able to transmit JE virus to a healthy person after biting an infected host with an incubation period ranging from 5 to 14 days.

The disease affects the Central Nervous System and can cause severe complications, seizures and even death. The Case Fatality Rate (CFR) of this disease is very high and those who survive may suffer from various degrees of neurological sequelae. (An estimated 25% of the affected children die, and among those who survive, about 30-40% suffers from physical & mental impairment). The children suffer the highest attack rate because of lack of cumulative immunity due to natural infections.

The incidence of JE disease is never an indication of the risk at which the population is living in JE endemic areas, because of in apparent infections, which tend to outnumber the apparent infections and also due to the lifelong immunity, which develops despite in apparent infection. The ratio of overt disease to in apparent infection varies from 1:250 to 1:1000. Thus the cases of JE represent tip of the iceberg compared to the large number of in apparent infections. Usually the number of overt disease cases reported from each village is 1 or 2.

Acute Encephalitis Syndrome (AES) is a general description of the clinical presentation of a disease characterized by high fever, altered consciousness etc., mostly in children below 15 years of age. Acute Encephalitis Syndrome (AES) has a very complex etiology and JE virus is only one of the many causative agents of Encephalitis. Further it is also evident that many cases are caused by entero-viruses which are spreading through unsafe drinking water sources. The disease is causing high mortality and disability.

The epidemiological analysis of the data collected from the states revealed the following:

- Most vulnerable age group is between 1-5 years followed by 5-10 years and 10-15 years in that order.
- Least JE infections are seen in infants (0-1 year).
- All the endemic states except Assam start reporting JE cases from July onwards attaining a peak in September- October.
- In Assam, the cases start appearing from February and attain a peak in the month of July.
- Due to circulation of entero-viruses, particularly in Eastern Uttar Pradesh, AES cases are reported round the year.

Realizing the gravity of problem of AES & JE in the country, a Group of Ministers was constituted vide Cabinet Secretariat's order no. 241/1/5/2011-CAB dated 4thNovember, 2011 by Govt. of India envisaging multi-pronged strategy encompassing preventive

(sanitation, safe drinking water, improvement in nutrition etc.), case management (capacity building of medical and para-medical staff, referral etc.) and rehabilitation (physical and social rehabilitation of disabled children) measures to address the problems relating to JE/AES. On the recommendations of the Group of Ministers, Govt. of India approved National Programme for Prevention & Control of JE/AES.

The operational guidelines have been prepared by the Directorate of NVBDCP for implementation of National Programme for Prevention & Control of JE/AES. The guidelines are intended to guide the programme managers at State & District level for better management of the programme by providing information on AES surveillance, JE Vaccination, early case detection and speedy referrals of complicated cases to well-equipped hospitals, rehabilitation of disabled children due to AES/JE which can help to reduce mortality & disability in affected children.

1.2 Goal and Objectives of the Programme:

Considering the complexity of JE/AES problem and the urgency of addressing the adverse consequences of the growing incidence of JE/AES through a multi-pronged strategy, a comprehensive National Programme on Prevention and Control of JE/AES has been launched with the participation of concerned Ministries/ Departments. The **goal** of the programme is be to reduce morbidity, mortality and disability in children due to JE/AES. The major **objectives** of the programme are:

i. to strengthen and expand JE vaccination in affected districts;
ii. to strengthen surveillance, vector control, case management and timely referral of serious and complicated cases;
iii. to increase access to safe drinking water and proper sanitation facilities to the target population in affected rural and urban areas;
iv. to estimate disability burden due to JE/AES and to provide for adequate facilities for physical, medical, neurological and social rehabilitation;
v. to improve nutritional status of children at risk of JE/AES;
vi. to carry out intensified IEC/BCC activities regarding JE/AES.

1.3 Strategy

The Ministry of Health & Family Welfare has been taking various prevention and control measures against Acute Encephalitis Syndrome (AES), but the nature of the problem suggests that AES should be construed as a broader development and rehabilitation challenge rather than merely a medical problem. Therefore, there is a need to put in place a multi-pronged strategy.

This strategy can be implemented only with the active engagement of the Ministries/ Departments of (i) Health and Family Welfare (ii) Drinking Water and Sanitation (iii) Social Justice and Empowerment (iv) Women and Child Development (v) Urban Development (Housing and Urban Poverty Alleviation) and (vi) Human Resource Development (Department of School Education and Literacy).

Role and responsibilities of different Ministries

2.1 Ministry of Health and Family Welfare

Ministry of Health and Family Welfare has been designated as nodal agency to monitor the progress on the implementation of following programme components recommended by Group of Ministers (GoM).

a) Strengthening and Expanding JE Vaccination.
b) Strengthening of Public Health Activities
c) Better Clinical Management of JE/AES Cases.
d) Physical Medicine and Rehabilitation (PMR)
e) Establishing of District Counseling Centres
f) Monitoring, Supervision and Coordination
g) Research-Cum-Intervention Project

2.2 Ministry of Drinking Water and Sanitation

Considering the risk of transmission of (Entero-viral infection) AES through contaminated drinking water, the provision of safe drinking water and proper sanitation are critical for the prevention and control of AES. Ministry of Drinking Water and Sanitation will undertake following activities to improve supply of drinking water and its quality in 60 priority districts.

(i) Installation of new IM-II hand pumps to replace private/public/shallow hand pumps.

(ii) Mini water supply scheme in habitations where JE/AES cases are reported, with energized deep bore-well and stand posts with adequate number of taps and provision for chlorination. In States/habitations where piped water supply schemes exist in the affected areas, they can alternatively utilize this fund for extension of pipelines, installation of disinfection units like Ultra-filteration (UF) Activated Carbon (AC), Ultraviolet (UV), Electro-chlorinator and related activities for controlling bacteriological contamination.

(iii) Water safety measures for drinking water sources in the affected areas; immediate repairs of hand pump platform, raising of hand pump platforms in flood prone areas, construction of soakage pits, chlorination, etc.

(iv) Solid and liquid waste management in the affected habitations/districts.

(v) Awareness generation and capacity building of local community and field level engineers and technicians.

(vi) Water quality testing of all public sources in the 60 districts with sample testing for virological examination.

The Ministry will take up following activities to improve access to sanitation facilities.

(i) Effective demand generation for sanitation facilities through awareness creation and IEC

(ii) Incentivising BPL households for construction and usages of Sanitation facilities.

(iii) Providing interest free loans out of revolving fund to APL households.

(iv) Providing sanitation facilities in schools and anganwadis housed in government buildings

The estimated costs of drinking water and sanitation components have been worked out based on requirements in 60 districts over a period of 3-5 years.

2.3 Ministry of Housing and Urban Poverty Alleviation (HUPA)

It is evident from available data that JE/AES is primarily a rural-based problem. However, JE/AES cases have been reported from some urban areas as well. Based on the reported cases and perceived risk of transmission of AES, a list of 66 municipalities which require adequate facilities for safe drinking water and sanitation has been prepared by the Ministry of Health and Family Welfare. The Ministry of Housing and Urban Poverty Alleviation has estimated slum households and slum population at 4.77 lakh and 24.9 lakh respectively in identified 66 municipalities in 43 districts.

2.4 Ministry of Social Justice and Empowerment

The Ministry of Social Justice and Empowerment fulfills its mandate of providing rehabilitation services to target populations through a network of national institutes, composite regional centres, and district disability rehabilitation centres established across the country. The Ministry is also operating various schemes, including Scheme of Assistance to Disabled Persons for Purchase/ Fitting of Aids/ Appliances and Deendayal Disabled Rehabilitation Scheme (DDRS) for promoting physical, psychological, social, educational and economic rehabilitation of persons with disabilities to enhance their quality of life and also

to enable them to lead a life with dignity.

The Ministry has already initiated process of setting up District Disability Rehabilitation Centres (DDRCs) in 60 priority districts. The Government of Tamil Nadu has set up DDRCs in all districts including 4 priority districts out of its own resources. The Ministry has also set up a Composite Regional Centre in Patna and, therefore, a separate DDRC is not needed in Patna. The Ministry will, therefore set-up and operate 15 new DDRCs in remaining priority districts in 4 States over 5 years as follows:

Sl. No.	States	Districts
1.	Assam (6)	Dhemaji, Golaghat, Sonitpur, Tinsukia, Udalguri, Lakhimpur
2.	Bihar (3)	Gopalganj, Nalanda, Saran
3.	Uttar Pradesh (5)	Balrampur, Kushinagar, Sant Kabir Nagar, Sitapur, Sravasti
4.	West Bengal (1)	Paschim Midnapur
Total 4 States and 15 Districts		

The Ministry will also assist the needy persons with disabilities in procuring durable, sophisticated and scientifically manufactured, modern, standard aids and appliances that can promote their physical, social and psychological rehabilitation on priority basis in 60 districts. Similarly, the Ministry will provide Grant-in-AID to voluntary agencies under Deendayal Disabled Rehabilitation Scheme (DDRS) to provide services for pre-school and early intervention, special education, vocational training, and community based rehabilitation and psycho-social rehabilitation in identified 60 districts.

2.5 Ministry of Human Resource Development (Department of School Education)

It was recognized that children with disabilities due to JE/AES need special facilities for their education. Department of School Education has informed that their mandate is to set up inclusive schools as no separate schools are established for mentally challenged children. However, it was agreed that a tailor-made curriculum was required to cater to specific needs of JE/AES affected children. It has been decided that a joint team consisting of officials from Ministry of Human Resource Development, National Institute of Mental Health and Neuro Sciences (NIMHANS) and Ministry of Social Justice and Empowerment will develop the curriculum, and the Ministry of Social Justice and Empowerment will set up special schools and training centres under Deendayal Disabled Rehabilitation Scheme (DDRS) in 60 districts based on assessed needs of affected children.

2.6 Ministry of Women and Child Development

Poor nutrition is an important risk factor for JE/AES. Therefore, it is critical that special efforts are made to improve the nutritional status of the children in affected areas. The Ministry of Women and Child Development will take steps to improve the monitoring of feeding of children at the Anganwadi centres with the help of district and state authorities under Integrated Child Development Services (ICDS) in 60 priority districts. The Ministry will also take special measures to train and sensitize Anganwadi workers and their supervisors regarding JE/AES.

The Ministry will also provide additional Take Home Ration (THR) to the moderately undernourished children enrolled under ICDS in 60 most affected districts.

Chapter - 2

Operational Guidelines for specific activities

2.1 Strengthening and expanding JE Vaccination.

Vaccination with the approved JE vaccine is one of the most effective preventive measures given the complex eco-epidemiology of the disease that involves multiple hosts supporting the circulation of JEV. In addition, vector control measures also have their limitations given the exophilic as well as exophagic tendencies of the proven vectors belonging to Cx vishnui group. Subsequent to a major outbreak of JE in Eastern UP during 2005, GoI introduced JE vaccination in some selected states of the country with SA-14-14-2 vaccine in phased manner starting from 2006. 10 districts in Karnataka have already been brought under JE vaccination as part of Universal Immunization Programme (UIP). The campaign was started in the year 2006-07 in Bellary district and every year more districts have been covered. During the campaign, all children in the age group 1 to 15 years were given one dose of the live attenuated vaccine. In the subsequent years all children who completed 1 year of age were given the vaccine.

Year	Duration of Campaign		Name of District	Target	Coverage	% Coverage
	From Date	To Date				
2006-07	10-07-2006	16-07-2006	**Bellary**	720517	535613	74.33
2007-08	09-07-2007	21-07-2007	**Kolar**	777354	681971	87.73
	09-07-2007	21-07-2007	**Raichur**	595975	512389	85.92
2008-09	30-06-2008	18-07-2008	**Koppal**	425241	296770	70.00
	30-06-2008	18-07-2008	**Mandya**	495000	412501	83.33
2009-10	09-06-2009	21-06-2009	**Vijayapura**	651610	464147	71.23
	09-06-2009	21-06-2009	**Dharwad**	546352	474521	86.85

As per Govt. of India guidelines, 2 doses of JE vaccine have been approved to be included in UIP to be given one along with measles at the age of 9 months and the second with DPT booster at the age of 16-24 months.

The vaccination performance in different districts of the state with two doses of JE vaccine is shown below:

Sl. No	Districts	2013-14		2014-15		2015-16	
		No. of Children 9-12 months who received JE 1st dose	Number of children (> 16 months old) received JE dose	No. of Children 9-12 months who received JE 1st dose	Number of children (> 16 months old) received JE dose	No. of Children 9-12 months who received JE 1st dose	Number of children (> 16 months old) received JE dose
1	**Bellary**	32115	33274	51252	48780	58458	47636
2	**Vijayapura**	22665	22609	28209	21284	46334	22985
3	**Chikkaballapur**	13379	11447	13512	12283	19314	11585
4	**Chitradurga**	3535	78555	20231	15175	28450	23669
5	**Davanagere**	10597	93888	12677	9372	31941	20375
6	**Dharwad**	20616	23493	31907	27878	35382	32186
7	**Kolar**	15866	16881	21225	19330	25750	20122
8	**Koppal**	17360	15477	19976	15833	30522	21079
9	**Mandya**	13658	20881	22574	21480	24469	23146
10	**Raichur**	13812	21512	37082	29486	43139	28800
	Karnataka	**163603**	**338017**	**258645**	**220901**	**343759**	**251583**

- **<u>Some important points about J.E. Vaccine</u>**:
- Live attenuated SA-14-14-2 JE vaccine, freeze dried to be stored and transported at 2-8°C, needs to be reconstituted and to be used within 2 hours of reconstitution
- 0.5 ml subcutaneous injection, irrespective of age group
- First dose at 9 months to 1 year of age generally given with the measles vaccine
- Second dose at 18 months generally given with DPT booster.

2.2 Strengthening of Public Health Activities

A district level model action plan including public health measures for containment of JE/AES envisages community based AES /JE surveillance, entomological surveillance, vector control, and IEC/BCC capacity building involving community volunteers.

2.2.1 Epidemiological Surveillance of AES / JE:

JE Surveillance implies a continuous monitoring of all factors influencing transmission and effective control of JE, building up capacity for early recognition of impending outbreaks or epidemics. It is pertinent that the JE Surveillance system collects the information on epidemiological, clinical, laboratory and entomological parameters from the identified sites on a regular basis.

Effective epidemiological surveillance of JE would require recording of encephalitis so that the actual disease burden can be assessed area wise. Various activities pertaining to epidemiological surveillance i.e. collection, compilation, analysis and interpretation of data, follow-up action and feedback should be carried out in a systematic and organized manner. Epidemiological surveillance of JE would include components of laboratory based serological surveillance and clinical surveillance.

To carry out clinical surveillance of JE, it is crucial that all health institutions, which are attending to patients either at outpatient department or as indoor cases, be on the lookout for any patients presenting with the signs and symptoms of encephalitis. All the reporting units (health institutions) in endemic areas, both in public and private sector, should further notify all these suspected JE cases based on standard case definitions. For reporting by all reporting units, a line list of these cases should be prepared on the standardized reporting format and submitted to the higher authorities.

For surveillance purposes, JE is commonly reported under the heading of "acute encephalitis". In the WHO's guidelines for JE surveillance, syndromic surveillance for JE is recommended. This means that all cases of Acute Encephalitis Syndrome (AES) should be reported. Laboratory confirmation of suspected cases can be done where feasible. The following case definition should be used for reporting of suspected JE cases in endemic areas:

Case Definition of Suspected case:

- Acute onset of fever, not more than 5-7 days duration.
- Change in mental status with/ without
    - New onset of seizures (excluding febrile seizures)
    - Other early clinical findings – may include irritability, somnolence or abnormal behaviour greater than that seen with usual febrile illness

Important

- In an epidemic situation fever with altered sensorium persisting for more than two hours with a focal seizure or paralysis of any part of body, is encephalitis.
- Presence of rash on body excludes Japanese Encephalitis.
- AES with symmetrical signs and fever is likely to be cerebral Malaria.

Case definition of Confirmed case: A suspected case with any one of the following markers:

- Presence of IgM antibody in serum and CSF to a specific virus including JE/Enterovirus or others
- Four fold difference in IgG antibody titer in paired sera
- Virus isolation from brain tissue
- Antigen detection by immune-fluorescence
- Nucleic acid detection by PCR

The surveillance will be carried out through sentinel sites and other health institutions.

- Sentinel Surveillance Sites with laboratory (SSSL) facilities
- Sentinel Surveillance Sites without laboratory facilities
- Other Informer Units

Sentinel Surveillance Sites (SSSL) with laboratory facilities

The key component of the AES surveillance system is the referral hospital with laboratory capacity to diagnose JE. These sites would include government or private health facilities which are engaged in treating a large number of AES patients.

In SSSL, Medical Officers (MOs), paediatricians and other physicians, nurses who see patients with AES should inform the designated Nodal Officer immediately upon presentation of the AES case. The case should be further subjected to laboratory investigations for which the nodal officer should immediately notify the District Vector Borne Disease Control Officer (DVBDCO) or the designated officer in charge of AES/JE surveillance in the district. The SSSL will regularly generate and transmit information on the AES/JE cases and outcome. These units will also send regular information to DVBDCO. There should be case investigation and line listing of suspected cases of JE in order to track these cases back their

villages and to take appropriate control measures. The list of approved SSSLs in Karnataka is furnished in Chapter 4 for further reference.

Records and Reports: The identified SSSL should maintain documentation of the patients reported upon. For reporting of AES and confirmed JE cases and deaths from States to NVBDCP, AESF-1 and AESF-1A form will be used. Line list of AES and JE confirmed cases will be maintained and submitted to SMO/SPO in the form AESF-3 by nodal officer.

Sentinel Surveillance Sites without laboratory facilities (SSSs)

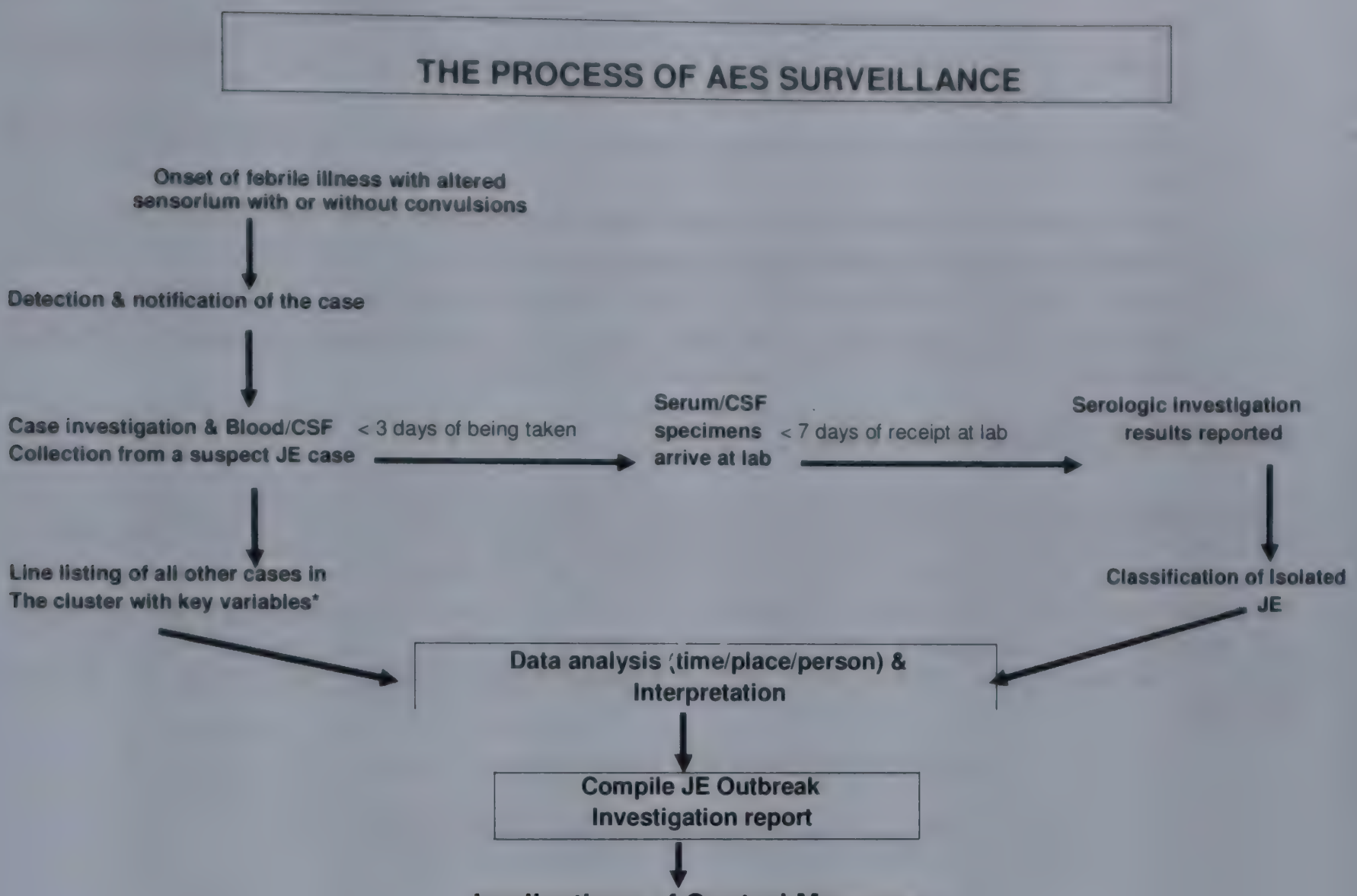
Some of the identified sentinel surveillance sites in government or private health facilities such as district hospitals, CHCs, PHCs etc., are engaged in treating a significant number of AES patients and do not have facilities for laboratory diagnosis of JE. Such sentinel surveillance sites will be linked to the nearest facilities or SSSL with facilities for sero-diagnosis of JE.

Informer Units (IU)

These are smaller health facilities or private practitioners who are visited by AES patients but in relatively smaller numbers than reporting units. These units should inform the DVBDCO or Surveillance Medical Officer (SMO) under National Polio Surveillance Project (NPSP) whenever they come across an AES case as is being done for reporting of AFP cases. They usually do not maintain detailed documentation of the patients visiting them.

To further strengthen the AES reporting at the district level, IDSP resources can be utilized and the Epidemiologist may be involved in investigation of the AES cases.

NOTES



JE surveillance activities at the district level:

The District Vector Borne Disease Control Officer (DVBDCO) or the identified health officer will study all reports received from all SSSL, SSSs without Laboratory and informer units and also reconcile data with existing surveillance systems such as IDSP to identify if there are any outbreaks. In the office of DVBDCO, compilation of all information/reports will be undertaken for interpretation and action. Report will be submitted to SPO form AESF-2, AESF-2A, AESF-3.

Case Investigation:

All cases that are notified should be verified and investigated by a specially trained DVBDCO, designated Surveillance Medical Officer or district level epidemiologist within 48 hours of notification. The necessary steps in the AES case investigation are:

Once a case of AES is reported by a physician, health unit or any other source, the District Vector Borne Disease Control Officer (DVBDCO) or any other designated official must personally see the case to ascertain if the case meets the AES case definition.

Using the case investigation form AESF-4 as a guide, obtain the history and conduct a physical examination of the patient. Co ordinate the collection of specimens of serum or CSF and transportation to the identified laboratory.

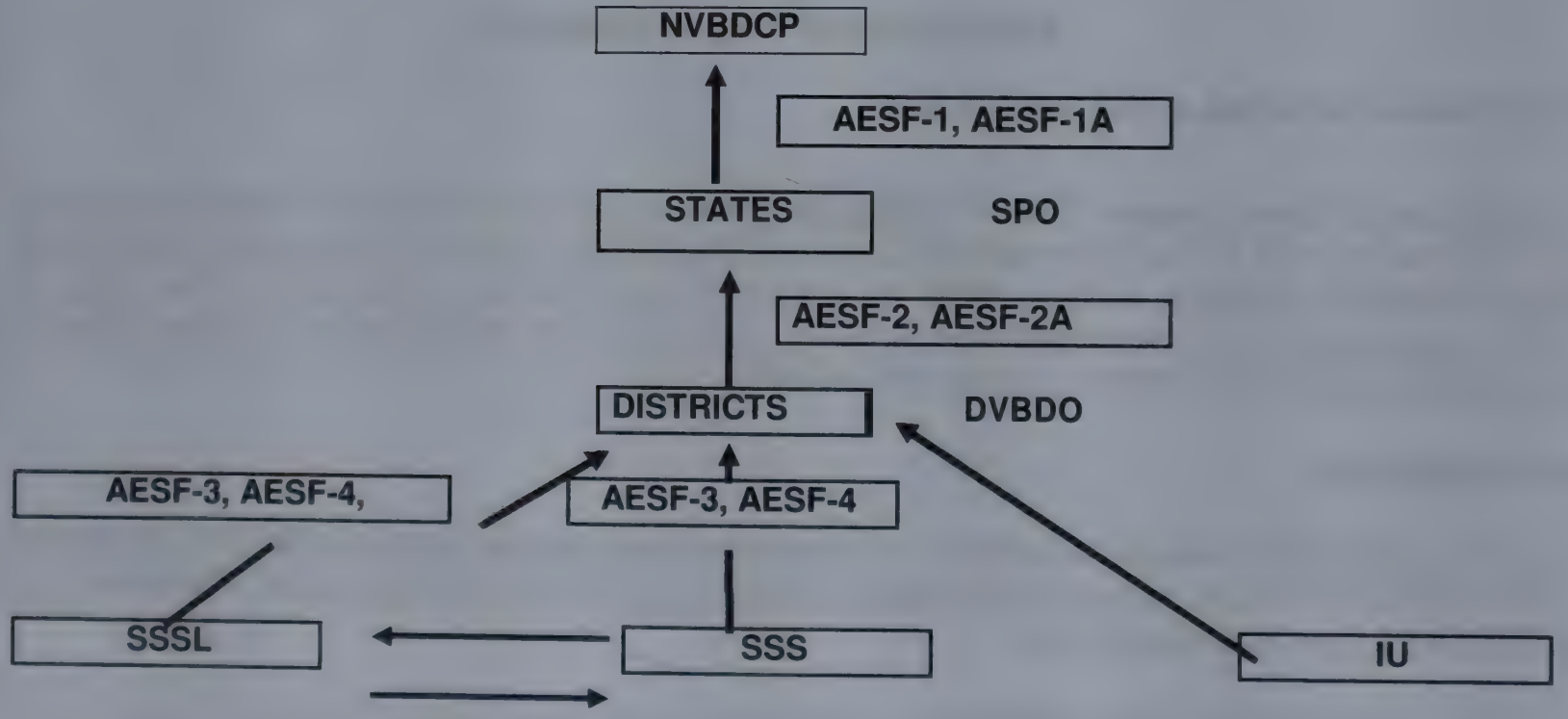
Completeness and timeliness of reporting from the reporting units should be regularly monitored. To summarize, following surveillance activities need to be carried out at the district level:

- Monitoring daily/weekly/monthly surveillance reports of AES/JE cases including "nil" case reports submitted by different reporting Units.
- Ensuring analysis of AES/JE cases and reconciling data with existing surveillance systems such as IDSP to identify if there are any outbreaks.
- Ensuring that all data from cases are properly collected, analyzed and interpreted from local action.
- Ensuring that surveillance reports and case investigation data are shared with other surveillance systems such as IDSP and forwarded to SPO, NVBDCP (National Vector Borne Disease Control Programme) on Daily / weekly or monthly basis as per requirement.
- Supervision and monitoring at all levels would be strengthened for ensuring effective surveillance.

Surveillance activities at state level

The District will report to the state on daily/weekly/monthly basis as per requirement depending on the disease situation.Data from the districts will be compiled and analyzed at the state level to understand the disease situation to provide feedback to the districts and to initiate appropriate prevention and control measures.To strengthen the JE/AES surveillance, the state may coordinate with existing ICMR designated Viral Diagnostic Laboratories (VDL). Final compiled data from the state will be sent to the national level on daily/weekly/monthly basis as desired by the disease situation.

Figure 3: INFORMATION FLOW DIAGRAM



AESF-1A & AESF-2A – during an outbreak

AESF 1/1A	=	AES Cases & JE cases reporting Form from the States
AESF 2/2A	=	AES Cases & JE cases reporting Form from the Districts
AESF 3	=	Line Listing Form
AESF 4	=	Case Investigation Form
SSSL	=	Sentinel Surveillance Sites with laboratory facilities
SSS	=	Sentinel Surveillance Sites without laboratory facilities
IU	=	Informer Unit

Periodicity of Reports

Daily report should be generated and transmitted in an outbreak situation, weekly report in transmission period and monthly report in inter-epidemic period. In outbreak situation action taken report should be sent along with daily report.

Note: The decision on the periodicity of the reports will be made at the state level by the state programme officer based on the local JE transmission pattern.

Monitoring indicators

- Completeness of monthly reporting
- Timeliness of monthly reporting
- Percentage of serum samples taken
- Percentage of all suspect cases for which specimens were collected
- Proportion of AES cases tested for JE
- Concurrent evaluation of JE vaccination campaign
- JE vaccination coverage under RI
- Percentage reduction in CFR

2.2.2 JE outbreak investigation and management

Monitoring the early warning signals for predicting an outbreak of JE is the key activity which needs to be established and undertaken at different level with utmost attention. The clues for an impending outbreak can be picked up from following.

- Prediction of high rainfall by the meteorological department, an unusual increase in the adult vector density.
- Relative increase in pig population and water frequenting birds should alert the local officers. They should share such information with the District Nodal Officer of JE Surveillance (DMO).
- Virus detected in the suspected animal hosts and in mosquitoes can also act as an indicator for warning a forthcoming outbreak.
- Other associated parameters and the surveillance data can be correlated to above to identify early warning signals.
- Epidemiological data for the last ten years would indicate the trend of the diseases in the specific area. Micro analysis of such data at the district level would help the district health officer to predict areas which are at risk of having epidemic outbreak of JE.

To obtain the earliest inkling of an impending outbreak, it is essential that all the components of surveillance i.e., collection, compilation, analysis and interpretation of data, follow-up action and feedback must be carried out in a systematic and organized manner. Supervision and monitoring at all levels is mandatory for ensuring effective surveillance.

The State Programme Officer compiles district-wise surveillance data generated through epidemiological, entomological, laboratory and veterinary surveillance, predict the suspected outbreak and warn the districts for implementation of proper measures for prevention of outbreak.

Outbreak investigations should be initiated if there is a sudden increase in cases or if cases reported are different from historical information, in terms of season, geographic area, age group or case fatality.

Disease surveillance being done under IDSP is a good platform for identification of an impending outbreak. The Form S being compiled at sub center level and analysed at the district level is expected to provide information regarding AES cases occurring in the community. The Form S has a component of fever with altered sensorium to be reported by the health worker. Form P which is generated at the PHC /CHC/ District Hospitals contains information to be provided regarding AES cases seen in the institutions. These two forms are to be analyzed on a regular basis at the PHC /district level to pick up cases early.

Outbreak investigation

JE is a disease of public health importance because of its epidemic potential and high case fatality rate. JE, in patients who survive, complications may lead to lifelong sequelae. The first major outbreak of JE occurred in Bankura and Burdwan districts, West Bengal, in 1973 and since then it has spread to many States/ UTs of the country. Though JE is primarily a disease of rural agricultural areas, where vector mosquitoes proliferate in close association with pigs and other animal reservoirs, epidemics have also been reported in peri-urban areas where similar conditions may exist. For investigation of an outbreak, the first principle is to have in place a system to receive early warning signals and confirm diagnosis. In areas of low JE endemicity, every single suspect JE case needs to be investigated. However in areas where JE is endemic, the term outbreak can be applied to an unusual increase in suspected JE cases compared to the normal transmission or increase beyond the normal range due to seasonal variations. This normal range will be different from place to place. Following steps should be taken for epidemic outbreak investigation:

Steps of Outbreak Investigation

- Define an outbreak.
- Assessment of the number of suspected cases in the area and confirmation of an outbreak. In case JE diagnosis is confirmed, incidence rates may be worked out.
- Delineation of the area involved in outbreak
- Investigation of reported cases in the Case Investigation Form (AESF-4).
- Line list of cases including age and gender distribution of suspected cases, date(s) of onset of fever and other symptoms in a chronological order and severity of illness of the cases, including deaths. (AESF-3).
- Laboratory confirmation of suspected cases
- Assessment for presence of reservoir host such as pigs, cattle, poultry in the near vicinity of suspected cases.
- Vector surveillance should be initiated immediately, which should include collection of larvae and adult mosquitoes, identification of vector species, density and for incrimination of the vector mosquitoes.
- History of JE outbreak in the past must be noted.
- Analysis and report on the distribution and risk factors associated with the outbreak.
- After an outbreak is over, detailed report of the outbreak must be prepared on the Form AESF-10 and submitted to Directorate of NVBDCP.

Anticipatory preparation for managing an outbreak of JE:

- Anticipatory preparations should be made for timely availability of medicines, equipment and accessories as well as sufficient number of trained medical, nursing and paramedical personnel.
- For clinical management of JE cases, we should identify facilities like CHCs, District Hospitals and Medical colleges. These institutions should ensure the availability of the necessary drugs, IV fluids & equipment before the onset of JE transmission season.
- It is essential for investigation of an outbreak that rapid response teams are constituted at state and district level for investigation and containment of an outbreak. These teams should have experts in medicine, epidemiology, entomology and microbiology.
- Peripheral institutions have to be prepared to manage any outbreak. For this provision should be made for Technical Malathion, fogging machines, health education materials, preliminary laboratory investigations, transportation of cases to referral centres before the transmission season.
- The staff should be oriented towards detection of cases and trained to take immediate remedial measures to report cases in prescribed format and also follow up for laboratory confirmation. The data should be collected and analyzed to understand the causes of the outbreak.

Outbreak containment

After receiving the warning signals and investigation of a suspected outbreak, the containment measures should automatically be rolled out. The rapid response team should be mobilized and it should start immediate containment action. To minimize the mortality and reduce CFR, prompt and appropriate clinical management of suspected JE cases is essential. Cases occurring in periphery, needing specialized care, should be referred to the referral centre without any delay. Some of the measures detailed below will be found useful for managing JE outbreak:

- Daily monitoring of the outbreak, cases and deaths besides early referral of cases to higher treatment centres.
- Daily report to State/ National Health Authorities
- The local health authorities, particularly the PHC medical officers and district health officials, must be aware of the disease profile in their area. As the overt, in a village in a given season does not exceed more than 2 cases, the local health personnel and the community at large must be alerted about reporting occurrence of any fever case with altered sensorium.
- For early reporting involve key members of the community.
- Control measures should be implemented immediately. Vector control measures especially fogging with the Technical Malathion should be carried out immediately in the affected village. Use of bed nets, full sleeve clothes etc., during evening hours should be promoted to prevent mosquito bites.
- Continued community education for personal prophylaxis like use of impregnated mosquito nets, keeping piggeries away from human habitations etc.

CHAPTER 2 A

Eco-Entomological Surveillance

Entomological surveillance helps to monitor JE vector density continuously in JE endemic areas (trend data), suggest appropriate vector control measures, undertake entomological investigations during epidemic and evaluate the impact of control measures. The entomologist and insect collectors or / Biologist / Entomologist attached with Filaria Control Unit may be assigned and made responsible for entomological surveillance in the district. They would identify index villages in the district for entomological surveillance.

In India, JE virus has been isolated from 17 mosquito species in wild caught specimens from different parts of the country. Maximum isolations have been recorded from Culex vishnui group consisting of Cx.tritaeniorhynchus, Cx.vishnui and Cx.pseudovishnui. Female mosquitoes get infected after feeding on a vertebrate host harbouring JE virus and after 9-12 days of extrinsic incubation period, they can transmit the virus to other hosts.

Culex vishnui subgroup of mosquitoes are very common, widespread and breed in water with luxuriant vegetation, mainly in paddy fields and their abundance may be related to their breeding in rice fields, shallow ditches, pools, fish ponds, etc. Preference for breeding places during rainy season and irrigation channels bordering the paddy fields support breeding during non-monsoon season. Rain water collections in low lying areas with aquatic vegetation/ submerged grasses support the breeding during post monsoon months. However permanent water collection in ponds, ditches etc., with aquatic vegetation such as water hyacinth, elephant grass, etc., provide favourable breeding places during all months. In view of the breeding habitats of the vector mosquitoes, JE is usually associated with rural areas with paddy cultivation.

Cx.tritaeniorhynchus, the principal vector of JE, has been reported to be an outdoor restor (exophilic) but may rest indoor during some part of the year. Vectors of JE are zoophilic and feed outdoor as well as indoor. They prefer to feed on cattle and also feed on pig. Cattle such as cows may reduce risk by diverting vector mosquitoes (zooprophylaxis).

For planning vector control measures, the bionomics of vector mosquitoes in an area needs to be studied.

2.A.1: Objectives of Entomological Surveillance:

1. To identify the JE vector mosquitoes in an area
2. To monitor JE vector abundance in JE endemic areas
3. To detect JE virus in vector mosquitoes
4. To suggest appropriate vector control measures .

Procedure:

Entomologist and insect collectors or/ Biologist in the districts will be responsible for entomological surveillance in JE endemic areas. An entomological team of National Institute of Malaria Research (NIMR) may also conduct these studies. They will identify index villages in the district for entomological surveillance.

Choice of index villages:

- At least 3 villages in which JE has occurred in the recent past (past five years)
- At least 2 villages which remained unaffected till date would be monitored in each affected block
- Sampling would be carried out on fortnightly basis
- Surveillance would be carried out round the year to know the JE vector density, their resting behaviour, feeding behaviour and detection/isolation of JE virus from vector mosquitoes.

Following entomological investigations are to be carried out:

Larval surveys:

Larval density and Mapping of breeding sites: Larval survey should be carried out by the entomological team periodically. All potential breeding sites will be surveyed and will be reported on the standard proforma. All permanent breeding sites of JE vectors would be identified (mapped) and provided to District officers for implementation of control measures.

Larvae collected in the field would be reared in laboratory for emergence of adult mosquitoes for identification of vector species. For this purpose, standardized reporting format AESF-6 form for breeding survey will be used by all the entomological reporting units.

Adult surveys:

Indoor/ Outdoor resting collection and the Dusk Collection should be carried out from fixed as well as random sites in indoor sites such as human dwelling/cattle sheds/mixed dwelling and outdoor situations such as bushes, plantations, standing crops etc., by hand catch method using suction tubes. Per Man Hour Density (PMHD) will be monitored and reported in standard prescribed format AESF-7. This collection would be carried out in the index villages only.

Cx.tritoeniorhynchus predominantly rests outdoors on agricultural crops and wild vegetation, depending on local situations, where they can also be monitored by BPD Hop Cage method; formerly known as sweep cage method (NICD). The density of mosquito may be estimated as average number of mosquitoes collected per 10 Hop Cages. The larger the area covered by hopping, the better representation of the mosquito density.

$$\text{Mosquito density (Per 10 HC)} = \frac{\text{Total number of mosquitoes collected} \times 10}{\text{Total numbers of hops made on vegetation}}$$

Susceptibility of JE vector mosquitoes and larvae:

Susceptibility status of JE vector mosquitoes to insecticides particularly Malathion in JE endemic areas should be carried out by entomological teams in the state/ICMR/ any other institute. Map should be prepared in all JE endemic states about the status of resistance in vector mosquitoes to insecticides. Format AESF-9 will be used for reporting susceptibility/resistance status of vector mosquitoes.

Method for Collection and Transportation of mosquitoes for isolation of JE virus:

For entomological studies, the virus isolation would be attempted from vector mosquitoes, which would be collected in a screw-capped clean test tube and sent to the laboratory at NIV/CRME. Particularly in epidemic situations, it becomes necessary to collect vector mosquitoes for isolation of JE virus.

In an epidemic situation, it is desirable to collect mosquitoes from the affected areas-both indoor and outdoor, so that they may be processed for virus isolation. This may give an indication of the species acting as vector of the area. Mosquitoes can be collected by standard method such as aspirator, baited traps, biting collections and light traps.

The mosquitoes should be held alive in 'Barraud Cages' wrapped with moistened lint or cloth. If the collection locality is not far from the laboratory or transportation can be done within a day or two, they may be transported alive in Barraud cages. For such transportation, it is necessary to provide raisins soaked in water or cotton soaked in 10% glucose solution inside the Barraud cage.

If the collection locality is far from the laboratory and immediate transportation is not possible, mosquitoes may be identified, pooled species wise and stored in liquid nitrogen, refrigerators or on dry ice for subsequent transportation to the laboratory. If facilities for liquid nitrogen or dry ice storage are not available in the field, transport medium may be used to store the mosquito pools. It is, however, necessary that such pools are constantly kept in the refrigerator or transported on wet ice. Since the Centre for Research in Medical Entomology (CRME), ICMR, Madurai and Tamil Nadu has developed a technique whereby the JE antigen can be detected in even 28 days old desiccated mosquitoes and NICD has also detected JE virus antigen even after 20 months of mosquito collection from field. It would be possible to get the JEV antigen detected from the mosquitoes regularly dispatched to CRME, Madurai by post. However, the care should have to be taken not to allow mosquitoes attacked by fungus or affected by dilapidation before enveloping for dispatch.

Laboratory Support:

The following virological investigations are carried out in labs:

1. Screening/ isolation of JE virus from suspected JE vector mosquitoes.
2. Vector incrimination would be done in collaboration with NIV Pune, CRME Madurai and NCDC, Delhi.

2.A.2: Vector Control

- JE vector are exophillic and exophagic in nature. The risk of transmission increases when the human dwellings and animal sheds particularly piggeries are situated very close to each other. When they are situated far from each other the risk of transmission is reduced.
- Because of outdoor resting habits and crepuscular nature, the vector control using indoor residual spray is technically not feasible. In addition to this, due to vast and enormous breeding habitats like perennial ponds, paddy fields and other water bodies larval control using various anti larval measures is also not feasible as it is resource intensive. Therefore, vector control using ULV fogging (ultra-low volume) is the only recommended method of vector control and can be used during JE epidemics also.

Pre requisites of thermal fogging:

- Thermal fogging with portable fogging is done in outdoor situations (outside human habitation), where large number of JE cases are reported.
- Fogging should be carried out in downwind to upwind direction.
- During outdoor fogging, it is important to direct the fog to all possible adult mosquito resting sites like bushes, tree-shaded areas and other outdoor resting in peri domestic habitats.
- The most effective type of thermal fog for mosquito control is medium / dry fog i.e. it should just moisten the hand when the hand is passed quickly through the fog at a distance of
- about 2.5 to 3.0 metres in front of the fog tube.

The technical specification recommended for fogging machine should be of BIS standard no. 14855 (Part 1): 2000 for Vector Control.

Time of Fogging:

ULV fogging is carried out only when right weather conditions are present. These conditions presented in the following table:

Climatic condition	Most favourable conditions	Average conditions	Unfavourable conditions
Time	Late evening between (17:00 19:00 hrs)	Early evening	Mid-morning or afternoon
Wind	Steady, between 3-13 km/hr	0-3 km/hr	Medium to strong, over 13 km/hr
Rain	No rain	No rain	Heavy rain
Temperature	Mild	Mild	Hot

Frequency of fogging:

During outbreak situations, fogging applications have to be carried out at 7-10 days interval till a significant reduction in vector densities is achieved.

Points to remember during ULV fogging:

- In the late evening hour, temperature is very cool when the vector mosquitoes are most active fogging is more effective.
- Cool weather in the evening hour is more comfortable for worker wearing protective clothing.
- In the afternoon, when the temperature is high, convection currents from the ground will prevent concentration of the spray close to the resting places of adult mosquitoes flying or resting, thus rendering the spray ineffective.
- An optimum wind speed of between 3 and 13 km/hr enables the spray to move slowly and steadily over the ground, allowing for maximum exposure of mosquitoes to the spray. Air movements of less than 3 km/hr may result in vertical mixing, while winds greater than 13 km/hr disperse the spray too quickly.
- In heavy rain, the spray generated loses its consistency and effectiveness. When the rain is heavy, spraying should be stopped and the spray head of the ULV machine should be turned down to prevent water from entering the blower.
- ULV fogging in JE control is not recommended as a routine vector control method. It should only be used during epidemics or when large number of JE cases are reported from any JE endemic areas.

Selection of insecticide and requirements of material and manpower:

The insecticide is selected on the basis of biological effectiveness against the vector concerned, its likely effect on target and non-target organisms, and its hazard to humans, threat to the environment posted by its proposed use, cost, transportation requirements and availability of suitable application equipment. Under NVBDCP, presently Malathion and Pyrethrum formulations are used for fogging applications.

For thermal fogging: 5 per cent Malathion (Technical) in kerosene/diesel (1 litre of technical Malathion in 19 litres of diluents). Cyphenothrin 5% EC synthetic pyrethroid is also recommended by NVBDCP, for outdoor fogging (3.5g of a.i. for 1 hectare or 7ml of Cyphenothrin 5% EC per 1 litre of diesel – 10 litres of this solution to cover 1 hectare area for outdoor fogging).

The application rate of insecticide with most of the equipment is generally < 0.5 litres per hectare and requirements can be worked out on this basis. Mostly the effective application is about 330 ml per hectare; however, it varies with type of machine used. Usually a maximum of 1-1.5 km radius from the epicenter of outbreak is considered adequate. The manpower requirement is also dependent on the type of equipment. Most of the portable mist blowers/foggers can be operated by one person, yet it is desirable to make a team of two operators to facilitate transportation of insecticides, spares etc., and maintenance of records of operations.

Personal Protection Measures:

In addition to the vector control, personal protection measures also help in reducing man vector contact and help in reducing disease transmission. Therefore, intensive IEC activity on use of personal protection measures in preventing JE cases is also essential. Some of the recommended personal protection measures are described below.

a. **Protective clothing**:- Clothing reduces the risk of mosquito biting if the cloth issufficiently thick or loosely fitting. Long sleeves and trousers with stockings may protect the arms and legs, the preferred sites for mosquito bites. School children should adhere to these practices whenever possible. Impregnating clothing with chemicals such as permethrin can be especially effective in preventing mosquito bites.
b. **Mats, coils and aerosols**:- Household insecticidal products, namely mosquitocoils, pyrethrum space spray and aerosols have been used extensively for personal protection against mosquitoes. Electric vaporizer mats and liquid vaporizers are more recent additions which are marketed in practically all urban areas.

Repellents:- Repellents are a common means of personal protection against mosquitoes and other biting insects. These are broadly classified into two categories, natural repellents and chemical repellents. Essential oils from plant extracts are the main natural repellent ingredients i.e. citronella oil, lemongrass oil and neem oil. Chemical repellents such ***as DEET: IUPAC Name: N, N - Diethyl - 3-methylbenzamide; Other names: N,N - Diethyl - m- toulamide - Chemical formula: $C_{12}H_{17}NO$; DMP: IUPAC Name: Dimethyl benzene - 1,2-dicarboxylate - Chemical formula: $C_{10}H_{10}O_4$;*** can provide protection against JE vector for several hours. Permethrin is an effective repellent when impregnated in cloth.

Procurement of fogging machine:

While procuring the fogging machine, the technical specification recommended for fogging machine should be of BIS standard no. 14855 (Part 1): 2000 (with a minimum capacity of 10 KW) for Vector Control. Procurement of these machines can also be made through Directorate of General of Supplies Disposals (DGS&D) in case a valid RC is in existence, but after following the KTPP act or existing procurement rules of the State.

2.A.3 Veterinary Based Surveillance:

By identifying the prevalence & density of pigs, ducks, and ardeid birds and detecting viral activity in susceptible hosts, veterinary surveillance helps to track the rate of Haemagglutination Inhibition (HI) antibody carriers and the appearance of antibody from fresh infection as an index of the spread of JE virus in animal host. Veterinary-based surveillance is conducted with the help of animal husbandry department. Sera sample from these animals is randomly collected for serology to ascertain transmission of JE virus. Sera sample from these animals is randomly collected for serology to ascertain transmission of JE virus.

Like most other arboviral infections, JE is basically a disease of animals. Pigs and birds, particularly those belonging to Family Ardeidae (e.g. cattle egrets, pond herons, etc.) are natural hosts. The virus is generally maintained in the enzootic form and appears as focal outbreaks under specific ecological conditions. Infection in human beings is caused as a result of spill-over of infection from zoonotic cycle.

At low vector density level, the virus circulates in ardeid birds-mosquito ardeid bird cycle. However, at the commencement of monsoon season or increased availability of surface area mosquito breeding e.g. paddy cultivate etc., the vector population builds up rapidly, the virus from wild birds through vector mosquito species spreads to peridomestic birds and then to mammals like cattle and pigs etc., and eventually spills over to man.

Natural Reservoirs of JE virus

a) Birds: Some species of birds like pond herons, cattle egrets, poultry birds, ducks and sparrows etc., appear to be involved in natural transmission of JE virus. Migratory birds may be involved in the transfer of virus one region to another.

b) Cattle: Cattle do not circulate virus in their blood but develop antibodies against them. Hence they do not act as natural host for the virus. It is believed that prevalence of an enormously large population of cattle in India as compared to pigs may act as deterrent to the spread of JE infection, as the vector mosquito species have got more preference for cattle blood as compared to that of human beings.

c) Pigs: Infected pigs do not manifest many overt symptoms of the disease but allow multiplication and circulation of the virus in their blood. They are capable of infecting a large number of vector mosquito species, which in turn may transmit the virus to man after the completion of extrinsic incubation period of 9-12 days. The pigs are thus considered to be "amplifier hosts" for the virus.

2.A.4 : Animal surveillance:

The purpose of animal surveillance is to track the rate of HI antibody carriers and the appearance of antibody from fresh infection as an index of JE viral activity and its spread in animal hosts.

Objectives:

The objectives of Veterinary based surveillance are:

- Prevalence of Pigs/Ducks, Ardeid Birds in an area
- To detect viral activity in susceptible hosts

Procedures:

Veterinary-based surveillance can be conducted with the help of Animal Husbandry Department. Assessment of pig density in relation to human habitation should be carried out. Density of other susceptible host population should also be carried out periodically. Sera sample from these animals should be randomly collected for serology to ascertain transmission of JE virus.

As the pigs are amplifying host for JE virus, monitoring of antibody titer in pigs would be helpful in determining viral activity. Generally, 5-8 months old piglets should be selected and blood samples should be collected. The antibody titre in the serum samples should be estimated. Detection of IgM antibody would indicate recent infection. The area where HI antibody carrier pigs are high and IgM antibody is detected the area can be considered at risk of JE virus infection.

Sera sample from pigs to be randomly collected for serology in collaboration with veterinary department to ascertain transmission of JE virus in pigs. The process of collection of pig sera would be on regular basis for generating regular data for early warning signals.

Laboratory analysis of Sera samples:

Animal sera sample collection should be done with the help of Veterinary Department and screening for antibody carriers could be done by microbiology unit of Veterinary Research Institutes having such facilities. Study of different strain of virus could be done with the help of NCDC, Delhi, National Institute of Virology, Pune and CRME, Madurai.

Differential diagnosis:

Disease outbreaks in pigs is characterized by abortions, fetal mummification or stillbirths, and encephalitis in pigs up to 6 months of age, or disease outbreaks in horses characterized by fever, jaundice or nervous signs of depression and in coordination or hyper-excitability should be considered as possible JE infections.

As a part of the emergency response, any clinical disease in pigs and horses that may be JE should be investigated to establish the extent of infection. Isolation of virus should be attempted from suitable cases. Serology should be conducted on sick horses, with sera-sampling two weeks later to confirm antibody conversion to JE. Similar serological monitoring should be conducted in piggeries suspected of being infected. If it was desired to define free zones, the surveillance requirements to establish and maintain the zone will have to be developed at the time. Pigs would be the most sensitive sentinel animals, though because of operational difficulties, the existing arbovirus surveillance programmes (that do not use pigs) would need to be used.

List of 60 JE/AES reporting priority districts

Sl. No.	States	Districts	
1	Assam (10)	1. Barpeta	2. Lakhimpur
		3. Dhemaji	4. Sibsagar
		5. Dibrugarh	6. Sonitpur
		7. Golaghat	8. Tinsukia
		9. Jorhat	10. Udalguri
2	Bihar (15)	1. Aurangabad	2. Nawada
		3. Darbhanga	4. Patna
		5. East Champaran	6. Samastipur
		7. Gaya	8. Saran
		9. Gopalganj	10. Siwan
		11. Jahanabad	12. Vaishali
		13. Muzaffarpur	14. W. Champaran
		15. Nalanda	
3	Tamilnadu (5)	1. Madurai	2. Thiruvarur
		3. Karur	4. Villupuram
		5. Thanjavur	
4	Uttar Pradesh (20)	1. Azamgarh	2. Kushinagar
		3. Ballia	4. Lakhimpur kheri
		5. Balrampur	6. Maharajganj
		7. Basti	8. Mau
		9. Bahraich	10. Rai Bareilly
		11. Deoria	12. Sant Kabir Nagar
		13. Gonda	14. Shaharanpur
		15. Gorakhpur	16. Shra Vasti
		17. Hardoi	18. Siddharth Nagar
		19. Kanpur Dehat	20. Sitapur
5	West Bengal (10)	1. Bankura	2. Hoogly
		3. Birbhum	4. Howrah
		5. Burdwan	6. Jalpaiguri
		7. Dakshin Dinajpur	8. Malda
		9. Darjeeling	10. Paschim Midnapur

The List of JE/AES Reporting 171 Districts in 19 States

S. No.	States	Districts	
1.	Andhra Pradesh (12)	1. Adilabad	2. Chittur
		3. Karim Nagar	4. Khammam
		5. Krishna	6. Kurnool
		7. Medak	8. Mehboob Nagar
		9. Nalgonda	10. Nellore
		11. Nizamabad	12. Warangal
2.	Arunachal Pradesh (1)	1. Changlang	
3.	Assam (16)	1. Barpeta	2. Darrang
		3. Dhemaji	4. Dibrugarh
		5. Goalpara	6. Golaghat
		7. Jorhat	8. Kamrup
		9. Lakhimpur	10. Morigaon
		11. Nagaon	12. Nalbari
		13. Sibsagar	14. Sonitpur
		15. Tinsukhia	16. Udalguri
4.	Bihar (24)	1. Aurangabad	2. Gaya
		3. Gopalganj	4. East Champaran
		5. Muzaffarpur	6. Nawada
		7. Samastipur	8. Siwan
		9. West Champaran	10. Arwal
		11. Araria	12. Banka
		13. Bhagalpur	14. Bhojpur
		15. Buxar	16. Jamui
		17. Jehanabad	18. Lakhisarai
		19. Nalanda	20. Patna
		21. Saran	22. Sheikhpura
		23. Vaishali	24. Darbhanga
5.	Delhi (2)	1. North District	2. North East District
6.	Goa (2)	1. North Goa	2. South Goa
7.	Haryana (6)	1. Ambala	2. Kaithal
		3. Karnal	4. Kurukshetra
		5. Panipat	6. Yamunanagar
8.	Jharkhand (8)	1. Giridih	2. Pakur
		3. Palamu	4. Ranchi
		5. W.Singhbhum	6. Dumka
		7. Jamtara	8. Sahibganj

9.	Karnataka (10)	1.	Tumkur	2.	Bellary
		3.	Bijapur	4.	Dharwad
		5.	Gadag	6.	Haveri
		7.	Kolar	8.	Koppal
		9.	Mandya	10.	Raichur
10	Kerala(2)	1.	Allepy	2.	Trivandrum
11	Meghalaya (4)	1.	East Khasi Hills	2.	West Khasi Hills
		3.	Jantia Hills	4.	Ribhoi
12.	Maharashtra (9)	1.	Gondia	2.	Amravati
		3.	Beed	4.	Bhandara
		5.	Gadchiroli	6.	Latur
		7.	Nagpur Rural	8.	Washim
		9.	Yavatmal		
13.	Manipur (8)	1.	Bishnupur	2.	Chandel
		3.	Churachandpur	4.	Imphal East
		5.	Imphal West	6.	Kangpkpi
		7.	Senapati	8.	Thoubal
14.	Nagaland (7)	1.	Dimapur	2.	Mokokchung
		3.	Wokha	4.	Kohima
		5.	Tuensang	6.	Zunheboto
		7.	Longleng		
15	Punjab(2)	1.	Sangrur	2.	Shaheed Bhagat Singh Nagar
16	Tamilnadu (13)	1.	Karur	2.	Cuddalore
		3.	Madurai	4.	Perambulur
		5.	Thanjavur	6.	Thiruvannamalai
		7.	Thiruvarur	8.	Tiruchirappalli
		9.	Vilupuram	10.	Kallakurichi **
		11.	Virudhunagar	12.	Tirunelveli
		13.	Pudukkottai		
17.	Uttar Pradesh (34)	1.	Allahabad	2.	Ambedkar Nagar
		3.	Azamgarh	4.	Ballia
		5.	Balrampur	6.	Barabanki
		7.	Bareilly	8.	Basti
		9.	Behraich	10.	Deoria
		11.	Faizabad	12.	Fatehpur
		13.	Ghazipur	14.	Gonda
		15.	Gorakhpur	16.	Hardoi
		17.	Jaunpur	18.	Kanpur Nagar
		19.	Kheri	20.	KushiNagar
		21.	Lucknow	22.	Maharajganj
		23.	Mau	24.	Muzaffarnagar
		25.	Pratapgarh	26.	Raibareilly

		27.	Saharanpur	28.	Sant Kabir Nagar
		29.	Shahjahanpur	30.	Siddharth Nagar
		31.	Sitapur	32.	Srawasti
		33.	Sultanpur	34.	Unnao
18.	**Uttarakhand(1)**	1.	Udham Singh Nagar		
19.	**West Bengal (10)**	1.	Birbhum	2.	Bardhaman
		3.	Hoogly	4.	Howrah
		5.	Paschim Midnapur	6.	Jalpaiguri
		7.	Dakshin Dinajpur	8.	Uttar Dinajpur
		9.	Malda	10.	Darjeeling
Grand Total: 19 States & 171 Districts					

List of Municipalities/ Local Bodies of 5 Priority States

Assam (23 Municipal Bodies)	
Name of Districts	**Name of Municipal Bodies**
1. Barpeta	1. Barpeta Municipal Corp.
	2. Howli
	3. Pathshala
	4. Sorbhog
2. Dhemaji	5. Dhemaji Town
	6. Silapathar
3. Dibrugarh	7. Dibrugarh Town
	8. Moran Town
4. Jorhat	9. Jorhat Town
	10. Mariani Town
	11. Titabar
5. Lakhimpur	12. Lakhimpur Town
	13. Bihpuria
6. Sivsagar	14. Sivasagar
	15. Nazira
	16. Sonari
7. Sonitpur	17. Tezpur
8. Tinsukia	18. Tinsukia
	19. Doomdooma
	20. Naharkatia
	21. Saikhowa
9. Udalgiri	22. Udalguri
	23. Tangla
Bihar (15 Municipal Bodies)	
1. Arwal	1. Arwal Nagar Parishad
2. Darbhanga	2. Darbhanga Nagar Nigam
3. East Champaran	3. Motihari Nagar Parishad
4. Gaya	4. Gaya Nagar Nigam
5. Gopalganj	5. Gopalganj Nagar Parishad
6. Jehanabad	6. Jehanabad Nagar Parishad
7. Muzaffarpur	7. Muzaffarpur Nagar Nigam
8. Nalanda	8. Bihar Sarif Nagar Nigam
9. Nawada	9. Nawada Nagar Parishad
10. Patna	10. Patna Nagar Nigam
11. Samastipur	11. Samastipur Nagar Parishad

12. Saran	12. Chhapra Nagar Parishad
13. Siwan	13. Siwan Nagar Parishad
14. Vaishali	14. Hajipur Nagar Parishad
15. W. Champaran	15. Bettiah Nagar Parishad
Tamil Nadu (2 Municipal Bodies)	
1. Madurai	1. Madurai
2. Thanjavur	2. Thanjavur
Uttar Pradesh (17 Municipal Bodies)	
1. Azamgarh	1. Mubarakpur
2. Bahraich	2. Bahraich
	3. Nan Para
	4. Risia
3. Balrampur	5. Notified Area Tulsipur
	6. Notified Area Pachperwa
4. Basti	7. Basti
5. Deoria	8. Deoria
6. Gorakhpur	9. Gorakhpur Nagar Nigam
	10. Sahjanwa
7. Kushinagar	11. Padrauna
8. Maharajganj	12. Maharajganj
	13. Nautanwa
9. Sant Kabir Nagar	14. Nagar PalikaParishad, Khalilabad
	15. Nagar Panchyat, Hariharpur
	16. Nagar Panchyat, Mehdawal
10. Siddharthnagar	17. Naugarh
West Bengal (9 Municipal Bodies)	
1. Birbhum	1. Suri
2. Dakshin Dinajpur	2. Balurghat
3. Darjeeling	3. Siliguri
4. Hoogly	4. Baidyabati
5. Howrah	5. Howrah
6.Jalpaiguri	6. Jalpaiguri
	7. Mal
	8. AlipurDuar
7. Malda	9. English Bazar

Components of Public Health Activities

Sl.No.	Component	Activity
1	Disease Surveillance	i) Capacity Building in Case management ii) Incentive for ASHAs
2	Diagnostic facility	i) Training
		ii) Reagent, etc.
3	Vector Control	i) Procurement of Technical Malathion
		ii) Arrangement of POL
		iii) Procurement of Pulse fog machine
		iv) Training of spray men
4	IEC/BCC	Advocacy Meetings i) ASHA/ AWW
		ii) Traditional Healers
		i) Community Education, Printing Material
		ii) Nukkad Natak at Block PHCs
		iii) Nukkad Natak at prominent places
		iv) Advocacy workshops
5	Monitoring and Supervision	Vehicle Hiring
6	Contingency	Three entomological kits, Cage, Traps, vials. test tubes stationery and postage etc.

Chapter 3

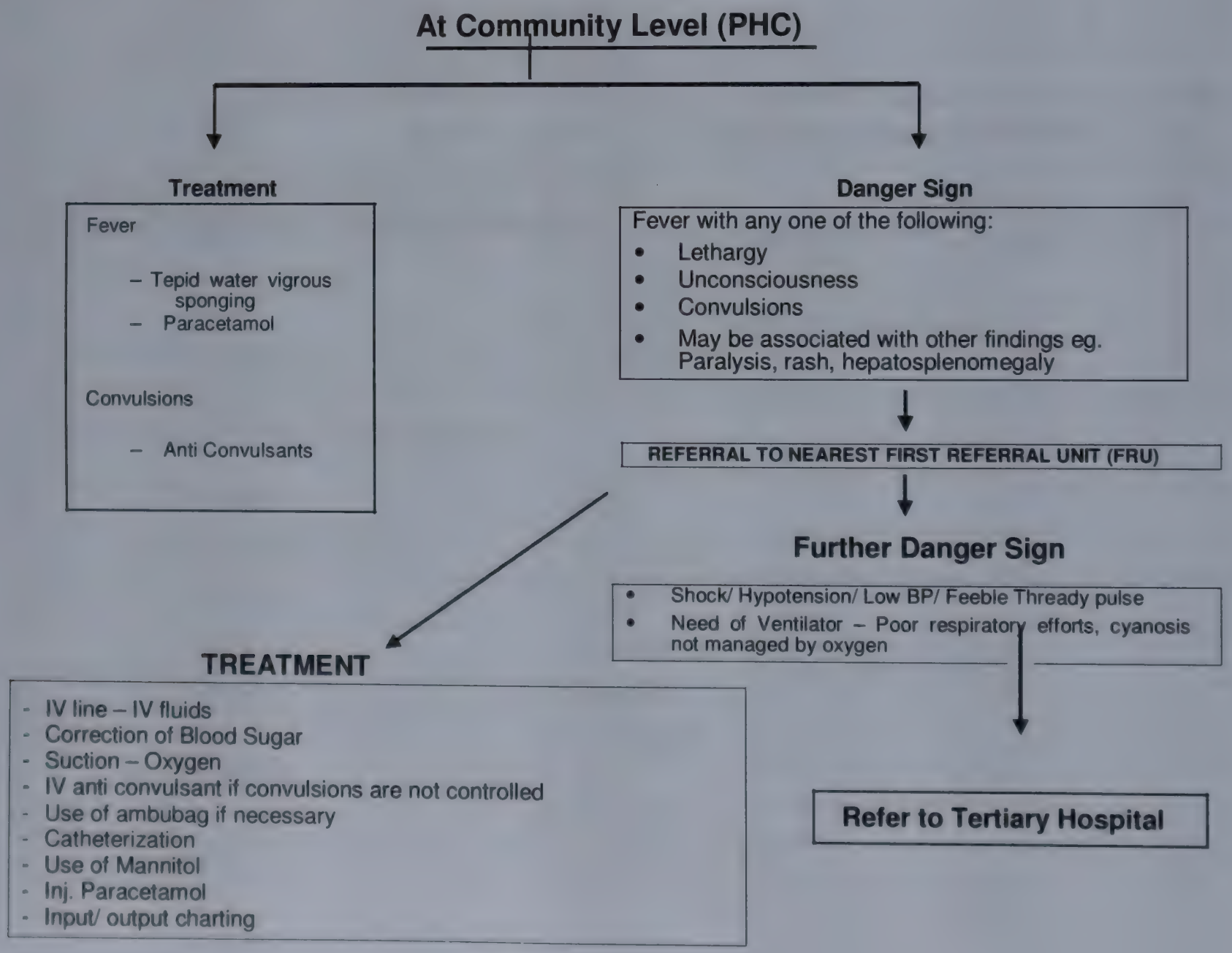
Case Management of Acute Encephalitis Syndrome/JapaneseEncephalitis

One of the major components of the Programme Strategy is the case Management of the patients, most of whom are admitted in Health Institutions in a serious condition. This necessitated NVBDCP to design guidelines on Case Management of Japanese Encephalitis in 2007 which can be accessed on the website. The evidence of circulation of entero-viruses in the community in Eastern UP was established by ICMR which prompted revision of above guidelines by incorporating the case management of other Encephalitis including JE. This revision was done in 2009 and the detailed guidelines are as follows:-

3.1 Danger Signs & Line of Treatment:

Management of Acute Encephalitis Syndrome including Japanese Encephalitis is essentially symptomatic. To reduce severe morbidity and mortality, it is important to identify early warning signs and refer patients to health facility and educate the health workers about the first line of management at the grass root level. Chart 1 depicts what is to be done for a patient at the community level.

Chart: Management of AES including Japanese Encephalitis



3.2 MANAGEMENT OF CASES OF AES INCLUDING JE:

Treatment at the health facility: It is important to exclude other causes of CNS affliction like meningitis or cerebral malaria which require specific treatment. Treatment will depend on the condition in which patient is received in the health facility. Since patients are likely to arrive with high grade fever and change in mental status or convulsions, proceed with the assessment of patency of airway.

The treatment at PHC/ CHC District level or at tertiary care hospitals remains the same. Depending upon the needs of care and availability of facilities available at the centre/ hospital, the patients to be transferred to the nearest higher centre for further management. It should be ensured before transferring the case, all the available treatment is provided to the patient. Only needy patients where such facilities are not available to be transported. The time consumed in transportation itself is a major cause of high mortality rate.

In all endemic areas, all the facilities including training can be arranged beforehand except Ventilatory Support. All Centres should be equipped with ambubag and oxygen in addition to other medicines and IV cannula.

<u>The treatment of the patients may require:-</u>

1.) Management of Airways and Breathing.

2.) Management of Circulation.

3.) Control of Convulsion and Intracranial pressure

4.) Control of Temperature

5.) Fluid and Electrolytes and Calories/ Nutrition

6.) General management

7.) Specific treatment of any for treatable cause

8.) Investigations, Samples Collection & Transportation

9.) Reporting of a case.

10.) Rehabilitation

MANAGEMENT OF AIRWAY AND BREATHING

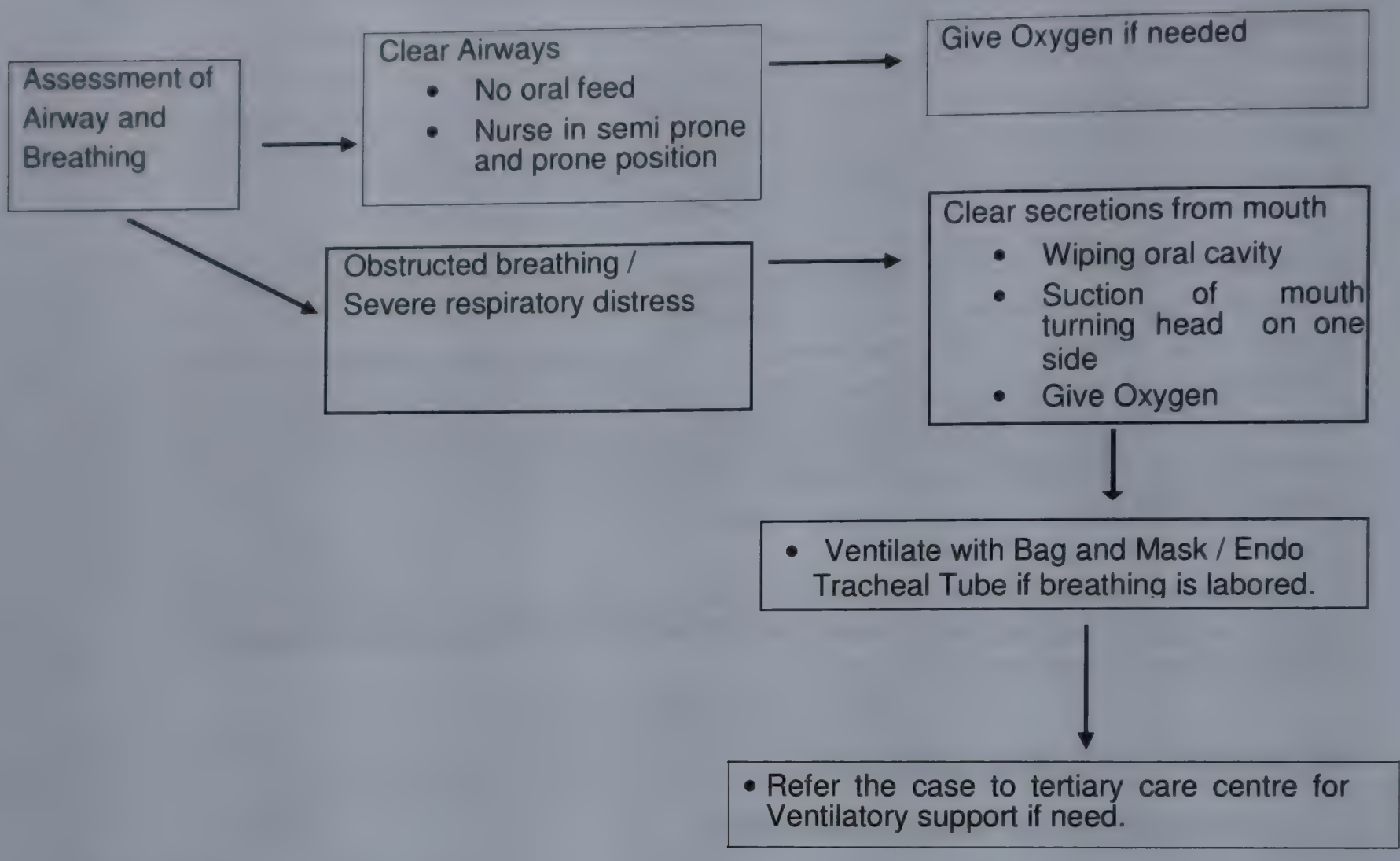


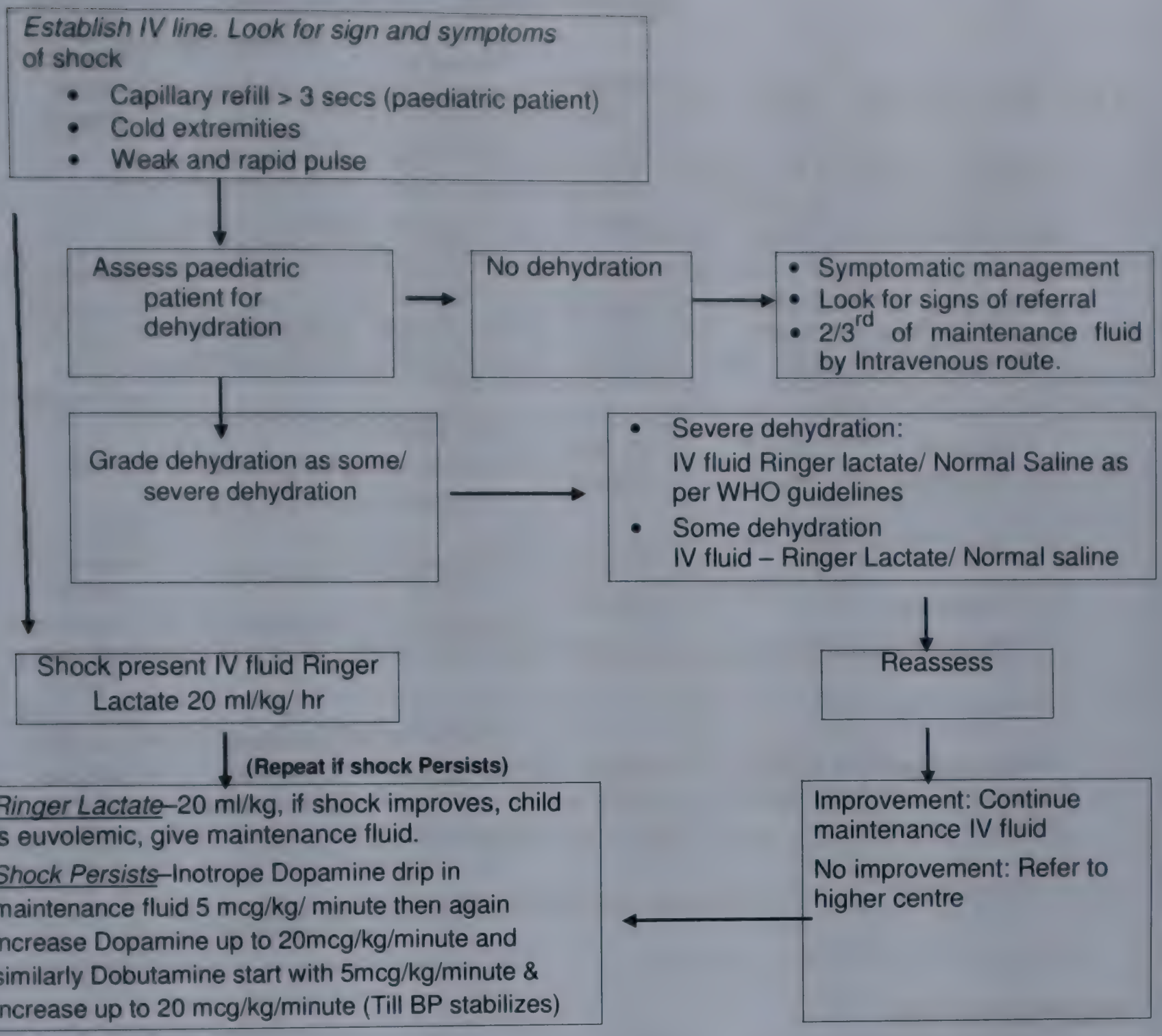
Fig 1.Position of the Patient

- Turn the patient on the prone side to reduce risk of aspiration.
- Keep the neck slightly extended and stabilize by placing cheek on one hand.
- Bend one leg to stabilize the body position.

Indications of Ventilatory Support

1. Deteriorating General Condition
2. Very Shallow Respiration/ Severe Respiratory Distress/ Heart Sound are Feeble
3. Capillary Refilling time/ colour of patient not improved
4. Dusky colour of body/ Cyanosis
5. Needs continuous Bag and Mask (Ambu) respiration
6. ABG Parameters.

MANAGEMENT OF CIRCULATION



NB :These are broad guidelines. Ultimate decision regarding management will depend upon the attending physician.

MANAGEMENT OF CONVULSIONS & I.C.T.

Give anticonvulsants if there was a history of convulsions and not given earlier or convulsions are present. Number one to three are first drug of choice, if convulsions are not controlled.

Anti Convulsants

Sl NO	Name of Drugs	doses	Available as	Route of Administration	Indication	Limitation/ Side Effects
1.	Phenobarbitone (Gardinal/ Luminal)	20-40 mg/kg As loading dose	200mg per ml	IV Slowly after dilution in normal saline	Convulsion in infants can be used in all age groups	
2.	Phenytoin (Eptoin/Dilantin)	15-20 mg /kg	100mg/ 2ml amp.	IV Slowly after dilution in normal saline	Convulsion in all age groups	Good drug for control of seizure & as maintenance
3.	Sodium Valproate	20-40 mg/kg	IV Oral Syrup	Syrup can be given as per rectal	All age group	-do-
4.	Diazepam	0.1-0.3mg/kg	IV or PR	IV slowly Syrup Suppository PR	Convulsions	May cause respiratory arrest in newborns & infants. Short Acting
5.	Lorazepam	0.05-0.1mg/kg oral	IV	IV Slowly	Uncontrolled Convulsion. Safe in infants	Tachycardia, Depression, Confusion, blurred vision
7.	Inj. Paraldehyde 11%	0.2mcg/kg deep gluteal can be replaced after ½-hrs.				

Maintenance Dose

- Phenobarbitone 3-8mg/kg/day IV or oral
- Phenytoin 5-8 mg/kg/day IV or oral
- Sodium Valproate 40-60mg/kg/day Oral

MANAGEMENT OF INCREASED INTRACRANIAL PRESSURE (Only after correction of Dehydration)

i. Mannitol 20% IV – 5 ml/kg in ½ hrs as 1st dose than 2.5 ml/kg at 6 hrs intervals up to 48 hours (8 doses).
ii. Injection Lasix IV – 1 mg /kg up to 40 mg can be given.
iii. Glycerol solution - Oral – 0.5 ml/kg mix with fruit juice can be given by nasogastric tube – 3 times a day
iv. Steroids – are not indicated in viral encephalitis including JE.

CONTROL OF TEMPERATURE:

a) If no rigors:-

i. Tepid Water Sponging: Not only on forehead, palms or soles, whole body to be wet with water and fan (ceiling/table/manual) is on. Cold sponging is harmful.

ii. If temperature is too high – Cold Sponges may be kept on head, axilla and groins.

iii. Injection Paracetamol: 5mg/kg, deep intra muscular at either lateral side of thigh or upper outer Quadrant of hip. If injection is not available, give Paracetamol 10-15mg/kg maximum up to 600 mg by Nasogastric tube. Paracetamol suppository are also available which may be used. Other antipyretic medicines e.g. nemusulide/brufen/meftal/aspirin etc., are not advisable, specially in children.

b) If chills or Rigors present :

i. Don't cover patients
ii. Don't do water sponging
iii. Use Paracetamol injection, syrup, through nasogastric tube or Paracetamol suppository as advised above.

MANAGEMENT OF FLUID ELECTROLYTES AND CALORIES/NUTRITION:

(A) Assessment of Dehydration:

Dehydration is classified into no/some/severe dehydration. Since it is difficult to assess dehydration in a patient of encephalitis as the patient is lethargic and unable to drink, therefore, skin turgor takes precedence over other signs. An objective way of classification would be as follows:

(i) Some Dehydration:

- Irritability
- Thirsty
- Sunken Eyes
- Less Tears
- Dry Mouth
- Skin Turgor Delay

(ii) Severe Dehydration:

- Floppiness
- Drowsiness/ Lethargy
- Unconscious
- Inability to Drink

(iii) Signs of shock

- Oliguria/ anuria
- Rapid and thready pulse
- Capillary filling time > 3 secs
- Low Blood Pressure

(B) Management of Dehydration:

(a) Some Dehydration:

- IV fluid Ringer lactate/ N saline 100 ml/kg to be given over 8 hrs.
- Where the facility for IV fluids is not available administer ORS 75 ml/kg in 4 hrs through nasogasrtic tube
- Reassess: If there is improvement, continue with maintenance IV fluid/if no improvement is detected, switch to plan for severe dehydration

(b) Severe Dehydration

- IV fluid Ringer lactate 100ml/kg is given as per the table below Table 1:

Rate of Fluid (Ringer Lactate)	30ml/kg	70ml/kg
< 1yr	2 hrs	4 hrs
>1yr	1 hrs	5 hrs

- Reassess: If there is improvement, switch to maintenance/if no improvement is detected or deterioration is observed infuse IV fluid more rapidly.

(b) Maintenance

Maintenance fluid is administered at the following rate Table 2:

Weight	Fluid Volume
1 – 10	10 ml / kg
11 – 20	1000 ml + 50cc/kg over & above 10 kg
21 – 40	1500 ml+20cc/kg over & above 10 kg

(C) Calories/ Nutrition

During CNS infections and convulsion and hyperpyrexia state, calories specially glucose required is increased and it should be given in form of 10% Dextrose or even 25% Dextrose may be given on arrival of the patient. A total dose of 200 mg/kg may be given. All IV fluids with Dextrose should be continued till patient is stabilized, convulsions are controlled, no vomiting and distention of abdomen. At this time, intra gastric feeding may be added and slowly IV fluids are replaced by total nasogastric feeding.

3.3 GENERAL MANAGEMENT:

i. ***Suction:*** Frequent suction either by mucous sucker or suction machine to be done on an unconscious patient, so secretion may not collect in mouth to avoid aspiration and maintenance of patency of airways.

ii. ***Nasogastric Aspiration:*** Nil orally. Place a Nasogastric/Ryles tube into stomach and do a frequent suction to avoid any vomiting and aspiration. It will also help in decompensation of stomach and decrease intra-abdominal pressure. It will help in respiration.

iii. ***Care of Eye, Bowel Bladder & Back :***

- Eyes to be covered by wet gauge
- An antibiotic Eye ointment may be applied twice a day or liquid paraffin may be put in eyes to avoid drying of Cornea.
- If child does not pass stool, put a glycerine enema.
- Bed should be well maintained. Don't allow to form any bed sore. Spirit & powder may be applied on back and on all pressure points.
- Frequent changing of patient's position.
- Catheterize the patient to avoid soiling of beds.
- Physiotherapy once patient is stabilized
- Other General Nursing Care
- Treat Secondary infections – by appropriate antibiotics
- Treat underlying other pathology – e.g. anemia, malnutrition etc.

3.4 TREATMENT OF SPECIFIC CAUSE IF ANY:

i. **Herpes -** Acyclovir–10 mg/kg/dose, slowly over a period of one hour–8hourly X 21 days.

ii. **Zoster Varicella -** Acyclovir–10mg/kg/dose, ½ hrs slowly, over a period of 1hour – 8 hourly X 2-3 weeks.

iii. **Malaria -** IV Quinine–20 mg/kg in 5% Dextrose slowly over a period of 1 hr then 10mg/kg 8 hourly. Monitor Blood Sugar and Blood Pressure.

iv. **Meningitis (Pyogenic) -**

Start with Inj Ampicillin 400 mg/kg 6 hourly up to 12gm/day+

Inj Ceftriaxone 100-150mg/kg as stat dose than in two divided doses, 12 hourly+.Steroid change antibiotics according to CS report and response.

v. **TBM** -Anti Tubercular Drugs (INH, PZA, Rcin + Ethambutol + Steroids)

vi. **Toxoplasmosis -** Pyrimethamine 2mg/kg/24 hours in two divided doses X 2days then 1mg/kg on alternate day.

vii. **Amoebiasis -** Metronidazole – 10mg/kg IV slowly 8 hourly X 10-14 days.

viii. **Fungal Infection -** Inj. Amphotericin–B 5mg/kg/24 hours or Fluconazole–oral 200-400mg/kg for 3-6 months.

ix. **Neurocysticercosis -** Albendazole oral 10mg/kg (up to 400 mg)/day X 2weeks.

Paediatric Intensive care unit (PICU) is a specific area of hospital where sophisticated monitoring, titrated life support, specific therapy and specialized nursing for potentially salvageable, critically ill paediatric patients with life threatening illness or injury, is provided.

It is evident that AES/JE causes inflammation of brain coverings (Encephalitis) which in most of the cases results in temporary/permanent Neuromuscular deficit. Such patients require more supportive/conservative treatment for a longer period. PICU beds are occupied by patients with a wide range of clinical conditions but all have dysfunction or failure of one or more organs, particularly nervous system, respiratory and cardiovascular systems. Patients usually require intensive monitoring and most need some form of mechanical or pharmacological support such as mechanical ventilation, renal or vasoactive drugs.

Adequate facilities at district hospitals are essential for better clinical management leading to improved survival of children affected by JE/AES.The PICUs are well equipped with medical equipments like paediatric ventilator, defibrillator, bed side monitors, blood gas analyzer and syringe pumps. For the patients requiring continuous supply of O2, there is provision of central gas supply (O2, compressed air, nitrous oxide and vacuum) in PICU. As encephalitis patient, due to abnormal Intra cranial pressure, requires closed monitoring of vital parameters like Blood Pressure, HR, RR and temperature, bed side monitors will be installed at each bed side. To have better view of all the patients, the PICUs will have central monitoring station from where the clinical parameters of the patients can be accessed.

Continuity and stability of nursing staff are of paramount importance in this area. Ideally, the nurses posted in PICU should not be rotated too often and senior medical nursing staff should also take interest in checking their standard of competence and training them adequately. Depending upon the workload of that area, the number of nurses should be decided.

3.5 REHABILITATION:

- Physiotherapy/ PMR
- Advice of Pediatric Neurologist
- Correction to fix deformity – by Orthopaedic Surgeon
- Child Psychologist advice
- Various prosthesis
- Artificial appliances

3.6 REPORTING OF A CASE:

It is very important to report all the suspected cases of AES or JE to the appropriate health authorities to prevent further spread of disease. It should be reported promptly in prescribed proforma. The details should be filled in clear and neat writing and all the information should be provided in the proforma.

3.7 CLINICAL DIFFERENTIATION OF JE FROM OTHER VIRAL/BACTERIAL/ PARASITIC INFECTIONS:

JE primarily involves the gray matter of many parts of the Central Nervous System. Differentiation of Encephalitis and Encephalopathy and making a probable etiological diagnosis of Japanese Encephalitis and Epidemic Brain Attack in rural areas (where facilities are minimum but expectations are maximum) on clinical grounds is extremely important to manage the encephalitis case, not only as an individual but also for the community, since the management of JE and EBA call for immediate reporting to the Health Authorities for a wider coordinated intervention by many different departments to contain the epidemic. Epidemics

of Viral Encephalitis demand a clinical diagnosis about the causative virus for controlling the epidemic at the earliest and for asking for the specific test.

Simple clinical observations help in assessing the depth of coma, planning emergency measures necessary to save the child, limit disability, prognosticate and to initiate epidemic control measures. This must be followed by neurological examination for any localizing signs and to plan for the urgent investigations for a final diagnosis.

Exclusion of treatable conditions like Cerebral malaria, Epidemic Brain Attack, Meningoencephalits, Herpes simplex virus encephalitis, Varicella/Zoster encephalitis, metabolic causes of encephalopathy should be done. Tuberculous Meningitis is extremely important since they require prompt additional specific treatment.

The therapy for JE/Epidemic Brain Attack is primarily conservative and supportive since there is no specific treatment for both Japanese Encephalitis and Epidemic Brain Attack and both have a high case fatality rate if prompt medical and nursing care is not provided.

Analysis of fatal cases of JE/Epidemic Brain Attack revealed that ignorance is killing more children than the pathogen per se. Only 1 death out of every 35 deaths is directly due to JEV and all others are preventable with prompt and early management bringing down the USUALLY REPORTED case fatality rate of JE from 35-50% to less than 1%. Similar degree of lowering of morbidity is also possible. Same is the case with Epidemic Brain Attack also.

The prognosis of JE depends on the extent of involvement at primary presentation, timely management and autoimmune mechanisms of this disease.

3.8 Management in Tertiary Level Hospitals

i. Hypoxia is alleviated by intubation, positive pressure ventilation and ensuring an arterial Pao_2 of 65 mm Hg or better.
ii. Hypotension is treated in a stepwise fashion by first volume infusion with isotonic fluids to normovolemia, next vasopressors and finally treatment is directed at reducing ICP in an effort to maintain CPP greater than 50.
iii. Brainstem involvement may necessitate intubation & mechanical ventilation.
iv. Cardiac arrest requires resuscitation measures.
v. SIADH (Syndrome of Inappropriate Anti Diuretic Hormone) is treated with Hypertonic saline.

Role of Immunoglobulins in Case Management of AES cases:

The experts are of the opinion that IV immunoglobulin cannot be recommended for routine use in AES cases including JE in view of the current scientific evidence.

Chapter – 3A
Paediatric Intensive Care Unit

Paediatric Intensive care unit (PICU) is a specific area of hospital where sophisticated monitoring, titrated life support, specific therapy and specialized nursing for potentially salvageable, critically ill paediatric patients with life threatening illness or injury, is provided.

It is evident that AES/JE causes inflammation of brain coverings (Encephalitis) which in most of the cases results in temporary/permanent neuromuscular deficit. Such patients require more supportive/conservative treatment for a longer period

PICU beds are occupied by patients with a wide range of clinical conditions but all have dysfunction or failure of one or more organs, particularly nervous system, respiratory and cardiovascular systems. Patients usually require intensive monitoring and most need some form of mechanical or pharmacological support such as mechanical ventilation, renal or vasoactive drugs.

Adequate facilities at district hospitals are essential for better clinical management leading to improved survival of children affected by JE/AES. In order to achieve this objective, it has been decided to set up a well-equipped 10-bedded intensive care unit (ICU) in district hospitals of 60 priority endemic districts. These PICUs will be well equipped with medical equipments like paediatric ventilator, defibrillator, bed side monitors, blood gas analyzer and syringe pumps. For the patients requiring continuous supply of O_2, there is provision of central gas supply (O2, compressed air, nitrous oxide and vacuum) in PICU. As encephalitis patient, due to abnormal Intra cranial pressure, requires closed monitoring of vital parameters like Blood Pressure, HR, RR and temperature, bed side monitors will be installed at each bed side. To have better view of all the patients, the PICUs will have central monitoring station from where the clinical parameters of the patients can be accessed.

Continuity and stability of nursing staff are of paramount importance in this area. Ideally the nurses posted in PICU should not be rotated too often and senior medical nursing staff should also take interest in checking their standard of competence and training them adequately. Depending upon the workload of that area, the number of nurses should be decided.

For day to day administrative, technical control and for round the clock coverage of the ward, medical officer who should preferably have critical care background be appointed in the PICU.

To keep abreast with the latest development in the field of medical technology, hands on training and refresher training have been scheduled for the doctors and nursing staff.

Chapter – 3B
Physical Medicine Rehabilitation

Objective – Relevance of the Department

Japanese Encephalitis/Acute Encephalitis Syndrome is one of the public health problems in the country because of the high case fatality rate which is about 30 % and residual neurological sequelae in 30-40% of children who recover. Limited therapeutic options and lack of specific treatment for JE/AES significantly contribute to the morbidity and functional impairment. Rehabilitation has become an integral subspeciality in the health care system to cater to the needs of these patients. There is a 'felt need' since long to have rehabilitation specialists (Physiatrists) trained in assessment, quantification and management of disabilities occurring as a result of JE/AES. Further a separate department of Physical Medicine & Rehabilitation is the need of the hour in the Medical Colleges in high endemic states in the country, which will contribute in rehabilitation, capacity building and human resource development in the field of rehabilitation.

Clinical Services

The department, to begin with, should have one unit and should provide the following patient care services:

Daily Outpatient Services: 9.00 AM onwards

Inpatient facility: 10 beds

General Ward (Male): 5; General Ward (Female): 5;

Therapy sections: A well equipped physical, neurological and psychological therapy should provide daily services for patients

Ideally the institute should have tie-up with centres with orthotic division (preferably part of the department), urologists and plastic surgeons for referrals, whenever necessary.

Supportive services from allied specialties namely neurology, imaging, neurosurgery, psychiatry, speech and hearing, psychology and social work.

Training/Academic programmes:

The department should have multi level teaching and training programmes:

Short term training programme for medical from government medical colleges and district hospitals can be initiated. These physicians can visit the centres for a period of three to six months and acquire skill in recognition, evaluation and management of common disabling conditions.

Training programme for other health professionals like Physical therapists, Occupational therapists, Psychologists, social works and community based health workers involved in rehabilitation.

Infrastructure

Space/ building

Ward should preferably be on the ground floor with easy accessibility of ambulance, car trolley and wheel chair. A covered verandah with steps, ramps are advisable. All clinical departments must be easily approachable. Ideally, it should be an independent wing of the hospital or an annex designed for wheel chair access. Wards with 10 beds (or more), each should be curtained for privacy. Toilets should be 45 cms high and extended 60 cms from wall, rail on one side and a bar to hold on the other side. Wash basin should be hand operated with clear distance for wheel chair to slide underneath-at least 75cms. Bath should have a telephone cord shower unit. Commode wheelchairs and shower curtains be provided.

The building should provide the following area:

- Ward
- Out-patient department
- Physiotherapy section - Hall, office, store room
- Occupational therapy section - Hall, office, store room
- Orthotic section (optional)
- Office for physicians
- ADL training room

Adequate space for inpatient, outpatient and department as per institute norms.

List of Equipment/Furniture required for PMR Department

1. Wards (Special requirements):

- Paraplegia Beds-Steel Plate base with 3 components 10
- Dunlop mattress-10cm thick 10
- Pillows-6 per bed 60
- Bedside Tables 10
- Adjustable dining / reading tables 05
- Wheel chairs 10
- Trolleys 02
- Tricycles (2-hand operated, 2 motorized) 04
- Water Mattresses 10

2. Physiotherapy

Sl No	Physiotherapy Equipment	Quantity
1	Electrotherapy	one
2	Short wave Diathermy	one
3	Ultrasound	one
4	Muscle Stimulator	one
5	TENS	one
6	Traction Lumbar & Cervical	one
7	Wax Therapy	one
8	LASER	one
9	Interferential therapy	one
10	Infra-Red Lamp (IRL)	one
11	CPM Apparatus (Continuous Passive Motion)	one
Exercise Therapy		
12	Shoulder Wheel	one

13	Shoulder Pulley Bracket-wall mounting	one
14	Shoulder abduction ladder	one
15	Wrist Circumductor	one
16	Wall bar	one
17	Grip exercise with six springs	one
18	Weight cuffs (1/2-3Kgs)	one
19	Parallel Bar	one
20	Dumbells Iron	one
21	Medicine Ball (1kg, 2kg, 3kg, 5kg)	one
22	Quadriceps table	one
23	Stair case-corner type	one
24	Couch for suspension	one
25	Multi exercise therapy unit	one
26	Ankle and leg exerciser	one
27	Static Cycle	one
28	Exercise mat	one
29	Postural training mirror	one
30	Ankle exerciser	optional
Mobility Aids		
31	Wheel chair	two
32	Walker adult	two
33	Walker paediatric	two
34	Prone crawler	two
35	Walking frame	optional
36	Crutch axillary	two

37	Crutch forearm	two
38	Aluminum stick	two
Treatment Equipments		
39	Examination couch wooden (Foam padded)	two
40	Tilt Table	two
41	Activity mattress	two

3. Equipments Required for Occupational Therapy:

Sl. No	Occupational Therapy Equipments	Quantity
1	Bed with mattress-Double bed with pillows	Two
2	Mirror (adjustable & per table)	One
3	Cognitoys	One set
4	Finger ladder	One
5	U.E.Sling	One
6	Shoulder wheel	One
7	Suspension U.E	One
8	Supra board	One
9	Nuts & bolts board	One
10	Hand exercise table	One
11	Stool with caster	Two
12	Bolsters big	One
13	U.E.Cycle	One
14	Sanding boards - Bilateral & Reciprocal	One+One
15	Coordination pig board with adjustable height	One
16	Post office box	One

17	Pinch tree	One
18	Push up blocks	One
19	Sliding tables	Two
20	Balance board (medium)	One
21	Spirometer	One
22	Skate board with frame	One
23	Weighted cuffs (3 different weights)	Six
24	Weight machine	One
25	Medicine balls	Two
26	Games	
27	ADL boards – 3 boards –predressing skills	
28	ADL taps, switches	
29	Adaptive devices	
30	Splints	

4. Specialized requirements:
   - Gait and Urodynamic laboratory

Manpower for PMR Department

Sl. No.	Post	Number
1	Professor (specialist PMR)	1
2	Assistant Professor (specialist PMR)	1
3	Resident Doctors/ Medical officers	4
4	Physiotherapist	2
5	Occupational Therapist	2
6	Clinical Psychologist	1
7	Social Worker	1
8	Vocational counselor	1
9	Catheter attendant	1 Optional
10	Orthotist	1 Optional
11	Administrative staff	3

* Staff for the hospital/ clinical services (Nurses, Hospital assistants etc.) to be computed along with other services.

TOR for Human Resource at PMR

Sl No.	Post	Qualification and Experience
1	Professor Physical Medicine and Rehabilitation	Qualifications: 1. A medical qualification included in Schedule-I or II or part II or the Third Schedule of the Indian Medical Council Act of 1956 {Candidate possessing qualifications included in part II of the III Schedule should also fulfill the conditions specified in Section 13(3) of the Act.} 2. A Post-graduate qualification e.g. MD in Physical Medicine and Rehabilitation or DNB in Physical Medicine and Rehabilitation of National Board of Examination. Failing availability of candidates with qualifications as in 2 above Post-graduate degree in Medicine, Paediatrics or Orthopedics. Experience: Experience in the field of Physical Medicine and Rehabilitation. The number of years of experience to be commensurate with that required in the particular state for that post.
2	Assistant Professor Physical Medicine and Rehabilitation	Qualifications: 1. A medical qualification included in Schedule-I or II or part II or the Third Schedule of the Indian Medical Council Act of 1956 {Candidate possessing qualification included in part II of the III Schedule should also fulfill the conditions specified in Section 13(3) of the Act.} 2. A Post-graduate qualification e.g. MD in Physical Medicine and Rehabilitation or DNB in Physical Medicine and Rehabilitation of National Board of Examination. Failing availability of candidates with qualifications as in 2 Above Post-graduate degree in Medicine, Paediatrics or Orthopedics.

		Experience: Experience in the field of Physical Medicine and Rehabilitation. The number of years of experience to be commensurate with that required in the particular state for that post.
3	Resident Doctor or Resident Medical Officer Physical Medicine and Rehabilitation	Essential Qualifications: A medical qualification included in Schedule-I or II or part II or the Third Schedule of the Indian Medical Council Act of 1956 {Candidate possessing qualifications included in part II of the III Schedule should also fulfill the conditions specified in Section 13(3) of the Act.} Desirable: Depending on the availability and existing rules for recruitment to the post at the state hospital: A Post-graduate qualification e.g. MD in Physical Medicine and Rehabilitation or Diplomate in Physical Medicine and Rehabilitation of National Board of Examination.
4	Physiotherapist	Bachelor degree in Physiotherapy.
5	Occupational Therapist	Bachelor degree in Occupational Therapy.
6	Clinical Psychologist	Post-graduate degree in Psychology. Experience of working with persons with disability.
7	Medical Social Worker	Post-graduate degree in Social Work. Experience of working with persons with disability.
8	Vocational Counselor	Post-graduate degree or diploma in Vocational Guidance or Psychology or Education. Experience of working with persons with disability.
9	Catheter attendant	Qualifications equivalent to Hospital Attendant.
10	Orthotics	Bachelor's degree in Prosthetics and Orthotics.
11	Administrative Staff	As per the state norms.

TOR of District Counselor

- Counselling of JE/AES affected children as well as their parents/attendants about post recovery complications like loss of speech and hearing, irritability and loco-motor and behavioural disorders.
- To raise awareness among civic and popular leaders about disability issues.
- To advocate and promote effective service delivery to people with disabilities across all sectors.
- To promote collaboration between Govt. on delivery of services if desired.
- To build capacity of people with disabilities, their families and communities for prevention and management of disabilities.
- To equip people with disabilities with skills so that they can participate in development activities.

Education: Possession of a master's degree with a major in counselling, rehabilitation counselling, or a counselling-related field such as psychology, social work or special education.

Experience: At least one year professional experience in providing rehabilitation counselling services at designated health facility.

Computer Literacy: Essential

Note:- The provision of the requisite leave for contractual position of the professionals/para-professionals under PMR/PICU/Monitoring & Supervision/Sentinel Sites/District Counselling Centre etc., shall be in accordance with the State Govt. rules.

List of required equipments and drugs at various levels

1 **Essential equipment at the PHC level:**

Air way sizes "0" and "1"
Mucus sucker
Rubber feeding tube of various sizes
5 ml & 2 ml syringes with needles
Thermometer
Adhesivetape
Enema set
Oxygen

2 **Essential Drugs at the PHC level:**

Syrup / Injection Paracetamol,
Diazepam rectal solution/Syp Diazepam/ Inj. Diazepam/Diazepam Suppository.
Suspension Valproate
Glucose powder
Tab/Inj Furosemide
Inj Paraldehyde
IV fluids

3 **Essential equipment at the CHC level Hospital:**

Air way Sizes "0" and "1"
Mucus Sucker
Rubber feeding tube size 14
5 ml Syringe
Thermometer
Adhesive tape
IV cannula, 22 to 24
AmbuBag,
Foley's catheters of various sizes
Lumbar Puncture sets
Provision for Cerebrospinal fluid analysis
Enema set

4 **Essential Drugs at the CHC level Hospital:**

Syrup Paracetamol
Rectal solution or Syrup
Diazepam, Suspension Valproate,
Syrup Chloralhydrate
Inj Diazepam,
Inj Phenytoin
IV fluids N/2, N/5 with 5 % Dextrose, 10% Dextrose Hypertonic saline
Normal saline
Inj Dexamethasone,
Inj Mannitol 20 %

Inj Furosemide
Oral Glycerol
Inj Dopamine
Inj Phenobarbitone
Vitamins
Syrup / Tab Haloperidol
Syrup Chloral Hydrate
Inj Paraldehyde
Inj. Ampicillin
Inj. Chloramphenicol
Inj Ceftriaxone

Chapter-4
Laboratory Network

4.1 Laboratory based serological surveillance:

Sometimes, it may be difficult to differentiate Japanese Encephalitis from those caused by other viruses, bacteria etc., as clinical signs of JE are indistinguishable from other causes of AES. Under such circumstances, laboratory confirmation is essential for accurate diagnosis of JE. Confirmation of a suspected or probable case of JE would require the support of a well-equipped laboratory to test blood and cerebrospinal fluid (CSF) for the same.

For strengthening of JE sero-surveillance in the country, following activities are carried out:

- Laboratory confirmation of JE cases
- Collection, Storage and Transportation of samples to serology laboratories
- Establish a network of JE testing laboratories
- Establish Reporting system and ensure use of uniform formats
- Establish internal quality assurance in the laboratory

The following Sentinel Surveillance laboratories in Karnataka State, are conducting MAC ELISA tests using the kits supplied from National Institute of Virology, Pune:

- Dept. of Microbiology, Vijayanagara Institute of Medical Sciences, Ballari
- Dept. of Microbiology, Karnataka Institute of Medical Sciences, Hubli
- National Institute of Virology field Station, IGICH campus, Hosur road, Bengaluru
- Manipal Centre for Viral Research, Manipal, Udupi district

The Neuro-virology department of NIMHANS, Bengaluru is the Apex laboratory for quality assurance of these SSLs but are also having their own ELISA kits for diagnosis where the samples can also be sent under special circumstances.

4.2 Laboratory confirmation of JE cases

The fever and AES surveillance will capture any suspected JE cases which can be confirmed by laboratory tests as per the following markers:

- Presence of IgM antibody in serum and/or CSF
- Four fold differences in IgG antibody titer in paired sera
- Virus isolation from brain tissue
- Antigen detection by immune-fluorescence
- Nucleic acid detection by PCR

Laboratory confirmation of suspected JE cases would be carried out in the identified sentinel laboratories. At the laboratories, the preferred test of JE diagnosis is the IgM Capture ELISA (enzyme linked immunosorbent assay).
Internal quality control of JE tests would be assured in the laboratory. These laboratories may also do other investigations or send the specimens to national levels as necessary. JE laboratories will also be included under the External Quality Assurance for laboratory services under NVBDCP.

4.3 Specimen collection and transportation

Blood (serum) and Cerebrospinal fluid (CSF) are the specimens to be collected for JE diagnosis. Blood samples should be collected from suspected JE cases within 4 days after the onset of illness for isolation of virus and at least 5 days after the onset of illness for detection of IgM antibodies. A second convalescent samples should be collected at least 10-14 days after the first sample for serology.

Patient information should be recorded as below on a laboratory request and report form (AESF-5) that must accompany the specimen when it is referred to the laboratory:

i) Name, age and sex of the patient.
ii) Full Mailing Address.
iii) Number of cases with similar illness in the locality/village/town.
iv) Name and contact address of treating doctor.
v) Brief clinical features with a special note on any asymmetry of clinical signs and symptoms.
vi) Three dates are very important :
- Date of last JE vaccination;
- Date of onset of first symptom
- Date of collection of sample.

vii) Label the vial with the patient name, date of collection and specimen type.
The specimens should be labelled with the number and this must be identical to the number given in the AESF-4.
viii) In the case of an outbreak, a laboratory request and report form in the form of a line list may be prepared.

4.3.1 Blood/Serum

Equipment for collection of serum: The following equipment and blood collection kit would be required

- 5ml vacutainer tube(non-heparinized) with 23 g needle/5ml syringe with needle
- 5ml blood collection tubes if syringe and needle is used for blood collection
- Disposable gloves and face mask (one set each)
- Tourniquet
- Sterilizing swabs
- Sterile serum storage
- Specimen labels, marker pen
- Band aid
- Zip lock plastic bags
- Lab request form
- Cold box(vaccine carrier) with ice packs
- First aid kit (Along with address of nearest referral facility in case of blood collecting complications).

Collection procedure

- Collect 5ml blood by venipuncture in a sterile tube labelled with patient identification and collection date
- The blood should be kept at room temperature until there is complete retraction of the clot from the serum
- Blood can be stored at +4° C to +8° C for up to 24 hrs before the serum is separated
- Do not freeze whole blood
- There are 2 options available to ensure that the proper specimen reaches the lab

Option 1

Transport whole clotted blood specimen to laboratory within 24 hours.

Option 2

- This could be centrifuged at 1000 rpm for 10minutes to separate the serum
- If centrifuge is not available, carefully remove the serum using a pipette, avoid extracting red cells
- Transfer the serum aseptically to a sterile labelled vial
- Store the serum at $+4^0$C to $+8^0$C until transport to the laboratory

Transportation of blood/serum specimens:

- Specimens should be transported to the laboratory as soon as possible. Do not wait to collect additional specimens before transporting
- Place specimens in Zip lock or plastic bags and pack with absorbent material (cotton/tissue paper)
- Use a Thermos flask with ice or a vaccine carrier
- If using ice packs (should be frozen) and vaccine carrier, place frozen ice-packs along the sides and place the samples in the centre
- Place lab request form in plastic bag and tape to inner side of the Styrofoam balls/ vaccine carrier
- Arrange a transporting date
- When the arrangements have been finalized, inform the lab of the time and manner of transportation
- Serum should be shipped on wet ice within 48 hours or stored at $+4^0$C to $+8^0$C for a maximum period of 7 days
- In case a delay is anticipated, sera must be frozen at -20^0C and should be transported to the specified laboratory on frozen ice packs. Repeated freezing and thawing can have detrimental effects on the stability of IgM antibodies.

4.3.2 Cerebrospinal fluid (CSF):

CSF specimen would be collected in a sterile screw capped bottles under all aseptic precautions by a trained person. The containers should be properly labelled and transported at the earliest to the designated laboratory. All attempts would be made to collect CSF sample for confirmation of diagnosis.

Collection procedure

CSF is the fluid that bathes, cushions and protects the brain and spinal cord. It flows through the skull and spine in the subarachnoid space, which is the area inside the arachnoid membrane. To obtain a specimen of cerebrospinal fluid the procedure is carried out by expert medical officer. Lumbar puncture (spinal tap) is the most common means of collecting a specimen of CSF.

- The patient is positioned on his side with his knees curled up to his abdomen and with chin tucked in to his chest. (Occasionally, this procedure is performed with the person sitting and bent forward)
- The skin is scrubbed and a local anesthetic is injected over the lower spine. The spinal needle is inserted, usually between the 3rd and 4th lumbar vertebrae.
- Once the needle is properly positioned in the sub-arachnoid space, pressures can be measured and fluid can be collected for testing

- After the sample is collected, the needle is removed, the area is cleaned and a bandage is applied
- The patient is asked to remain flat or nearly flat for 6 to 8 hours after the procedure.
- Overall discomfort is minimal to moderate. The entire procedure usually takes about 30 minutes, but it may take longer. The actual pressure measurements and fluid collection only takes a few minutes.

Examination of CSF is an essential step in the diagnosis of any patient with evidence of meningeal irritation or affected cerebrum. Approximate 2-3 ml of CSF is collected and part of it is used for physical, cytological, biochemical, and microscopic examination and the remaining CSF is to be stored aseptically for serology, viral culture, bacteriological or fungal examination. The following important precautions need to be taken for CSF collection and transportation:

- CSF is a precious specimen. Handle it carefully and economically. It may not be possible to get a repeat specimen
- Collect CSF in a screw capped sterile container and not in an injection vial with cotton plug
- Do not delay transport and laboratory investigations
- Perform physical inspection immediately after collection and indicate findings on laboratory requisition form
- Store at $+4^0$C, if delay in processing is inevitable.

Storage and transport of CSF sample

Place the specimens at $+4^0$C as soon as possible after collection. Dispatch these at the earliest possible opportunity on wet ice in a large thermos or an ice-box to the designated laboratory. Considering the emergency, preference should be given to hand carry the sample to the designated laboratory. Samples for PCR should be transported on dry ice. A designated person (or persons) would be responsible for storage, packing and transport of samples according to national or international guidelines.

Criteria for rejection of CSF/Serum samples

- Leakage of sample
- Haemolyzed sample
- Inadequate quantity
- Improper cold chain maintenance during transportation
- Improperly labelled sample
- Samples collected in improper containers
- Turbid serum sample (contaminated)

4.3.5 Reporting

All test results would be conveyed back to respective Sentinel Surveillance/Reporting Units and to DMO in the form (AESF- 5) for planning and implementation of appropriate control measures. All compiled reports will be sent to SPO.

4.3.6 Quality Assurance

All the laboratories are to be accredited by WHO. This accreditation requires 100% proficiency score in test panels and a yearly on-site review by trained WHO virologists. The programme monitors the turn-around time between specimen receipt in the laboratories and report for all laboratories in the network. The Sentinel Surveillance Labs of Karnataka have been approved by the NVBDCP directorate, as per accreditation norms.

4.3.7 Sero-Surveillance in vaccinated children

Any case of post vaccinated effects like fever seizures etc., should be investigated for the virus strains to match the same with the vaccination strain or otherwise. For children vaccinated with JE vaccine within six months of illness onset, testing a single serum sample for JE IgM may not be diagnostic. Diagnosis can only be confirmed by demonstrating JE IgM in the CSF, JE virus isolation, a positive nucleic acid amplification test, immunohistochemistry, IFA, or a four-fold or greater rise in antibody titre in acute and convalescent phase serum samples.

PROFORMA FOR MONTHLY REPORT ON ACUTE ENCEPHALITIS SYNDROME CASES/ JAPANESE ENCEPHALITIS * FROM STATES

State_____

Period included in the report: From_____ **to** _____

Date of Report:

Sl.No.	Name of the Districts	Disease	Name of Affected PHCs	No. of cases reported - Age wise (corresponding month of last year)										No. of cases reported - Age wise (Current month)										Cumulative Total				Number of samples Collected	No. found +ve for JE		Remarks
				0-1		1-5		6-15		>15 yrs		Total		0-1		1-5		6-15		>15 yrs		Total		Cases		Deaths					
				M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	V	N	V	N		V	N	

C: Cases D: Death M: Male F: Female V: Vaccinated N: Not Vaccinated

** Mention causes of encephalitis or AES unknown.

(Name & Signature)
Designation

Send this report to NVBDCP, New Delhi by Fax No. 011-22185935, **email:** nvbdcp-mohfw@nic.in

PROFORMA FOR DAILY/WEEKLY REPORT ON ACUTE ENCEPHALITIS SYNDROME CASES/

JAPANESE ENCEPHALITIS * FROM STATES

State_____Year_____Month_____Weekly Report (from---------to---------)/ Daily Report (date-------)

Sl. No.	Name of District	Disease	During the week / Day				Progressive Total (From 1st January to ---------)				Remarks
			Cases	Deaths	No. of samples Collected	No. found + ve for JE	Cases	Deaths	No. of samples Collected	No. found + ve for JE	Cases
1.		AES									
		JE									
2.		AES									
		JE									

*= Daily report during epidemic/outbreak and weekly report otherwise

(Name & Signature)
Designation

During outbreaks, send this report daily to NVBDCP, New Delhi Fax No. 011-22185935**, email:** nvbdcp-mohfw@nic.in

AESF-2

PROFORMA FOR MONTHLY REPORT ON ACUTE ENCEPHALITIS SYNDROME CASES/ JAPANESE ENCEPHALITIS * FROM DISTRICTS

State_____ **District**_____

Period included in the report: From_____ **to** _____

Date of Report:

Sl.No.	Name of the Districts	Disease	Name of affected PHCs	No. of cases reported - Age wise (corresponding month of last year)										No. of cases reported - Age wise (Current month)										Cumulative Total				Number of samples Collected	No. found +ve for JE		Remarks
				0-1		1-5		6-15		>15 yrs		Total		0-1		1-5		6-15		>15 yrs		Total		Cases		Deaths					
				M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	V	N	V	N		V	N	

C: Cases D: Death M: Male F: Female V: Vaccinated N: Not Vaccinated

** Mention causes of encephalitis or AES unknown.

(Name & Signature)
Designation

Send this report to Sate Programme Officer (SPO) _____ **by Fax Number** _____**or email ID**

PROFORMA FOR DAILY/WEEKLY REPORT ON ACUTE ENCEPHALITIS SYNDROME CASES/ JAPANESE ENCEPHALITIS * FROM DISTIRCTS

State_____Year_____Month_____Weekly Report (from---------- to----------)/ Daily Report (date-------)

Sl. No.	Name of the Sentinel Surveillance Site	Disease	During the week / Day				Progressive Total (From 1st January to ---------)				Remarks
			Cases	Deaths	No. of samples Collected	No. found + ve for JE	Cases	Deaths	No. of samples Collected	No. found + ve for JE	Cases
1.		AES									
		JE									
2.		AES									
		JE									

*= Daily report during epidemic/outbreak and weekly report otherwise

(Name & Signature)
Designation

During outbreaks, send this report daily to State Programme Officer (SPO) _____by Fax Number_____or email ID

Linelist of AES/ JE Cases

Monthly/ Weekly/ Daily Report (Encircle the appropriate*)

AESF-3

This report is sent from _____(Specify name of SSS/District/State)

Period Included in this report from _____to _____
Total Number of Cases in this period _____(Write "Nil" if there are no cases)
Date of Report:

Case ID Number	Name & address	District Name	Block Name	Religion	Sex	Age	No. of Doses	Date of last JE vaccination	Date of admission	Date of onset of symptoms	Date of onset fever	Change In mental status (Y/N)	Seizure (Y/N)	Type of sample	Date of sample Collection	Lab Result	Outcome	Remark
				(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
AES-																		
AES-																		
AES-																		
AES-																		
AES-																		

Person sending the report :_____Designation _____Signature_____

(1) Religion: H= Hindu, M=Muslim, O= Others
(2) Sex of child :M= Male F=Female
(3) Age
(4) No of vaccination doses (5) date of last JE vaccination
(6) Date of Admission
(7) Date of onset of symptoms
(8) Date of onset fever
(9) Change in mental status
(10) Seizures yes=1, no=2, unknown=3
(11) specified type of samples collected i.e. blood or CSF (12)date of collection
(13) Lab Result: 1=Positive, 2=Negative, 3=Not tested, 4=Unknown
(14) Status at Discharge: Normal/Disable/Died on /Any other
(15) Final Classification: 1=Lab Confirmed JE 2= Probable JE 3=AES Unknown, 4= AES other agent Date of death or discharge

*Daily report during epidemic /outbreak, Weekly report in transmission season and Monthly report every month

(Name & Signature)

Designation

ACUTE ENCEPHALITIS SYNDROME/ SUSPECTED JE CASE INVESTIGATION FORM

EPID NUMBER: AES-_____ - _____ - _____ AESF-4

Reporting information

ate Case Reported: _____/ _____/ _____ Notified by:_____

ate Case Investigated:_____/ _____/ _____ Investigated by:_____

Patient information

atient's Name:_____ Sex:_____

ate of Birth: _____/ _____/_____ Age: Year_____Months_____

ather's Name:_____ Religion : Muslim / Hindu / other

ddress: Landmark:

_____ _____

illage / Mohalla:_____ Block/Urban area:_____

istrict:_____ State: Setting: Urban / Rural

Travel history over past two weeks from onset of first symptoms

ate from:

ate to:

ddress

lock

istrict and

tate

Immunization history

E immunization :Yes / No / Partial / Unknown Date of last JE immunization:_____/ ____/ ____

Signs and Symptoms

ate of onset of first symptoms:_____/ _____/_____ Headache: Yes / No / Unknown

hange in mental status: Yes / No / Unknown Paralysis: Yes / No / Unknown

ever: Yes / No / Unknown Unconsciousness: Yes / No / Unknown

eizure: Yes / No / Unknown Neck rigidity: Yes / No / Unknown

ate of contact with public health system (PHC/CHC/DH)

etails of contacts with private practitioners 1.....2.....3.....

ode of transport to health facility.....

ny Other, specifiy:_____

Sample collection, tracking and results

Specimen	Date of Collection	Date of Sending	Date of result	Condition of sample	Laboratory Result (circle)
CSF					Positive/Negative/Not tested/Unknown
erum 1					Positive/Negative/Not tested/Unknown
erum 2					Positive/Negative/Not tested/Unknown

Diagnosis and final classification

inal classification: Laboratory confirmed JE / Probable JE / AES unknown / AES other agent

linical diagnosis:_____ _____

Discharge status

tatus at discharge: Alive / Dead / Unknown Date of discharge: _____/_____/_____

f alive, status of recovery: Recovered completely / Recovered with disability

f died, date of death: _____/_____/_____

Condition is good if adequate and specimen is transported in reverse cold chain

(Name & Signature)
Designation

FORMAT FOR MOSQUITO BREEDING SURVEY REPORT

1) State_____ Zone_____ District_____ PHC_____ Locality_____

2) Month _____ Year _____

Sl. No	DETAILS OF MOSQUITO BREEDING SITES	NO. CHECKED	Number found +ve			DENSITY/ DIP	NAME OF SPECIES IDENTIFIED*
			Anopheles	Culex	Aedes		
1							
2							
3							
4							
5							
6							
7							
8							

*For identification of JE vectors: Larvae of mosquitoes may be reared in the Laboratories for adult emergence, as adult is easy to identify.

1) Remarks : _____

Signature of the investigator

(Name & Designation)

FORMAT FOR MONITORING OF JAPANESE ENCEPHALITIS VECTOR DENSITY

A.1) State_____ Zone_____ District_____ PHC_____ Village_____

2) Month of Collection _____

3) Name of the insecticide sprayed _____ Date of last spray _____

4) Spray coverage **Population** **Room** **House** **CS**

in % ---------- ---------- ----------

B. **JE Vector Density** (Per man hour density)

1. Time of collection (Morning hr collection) 6 a.m.–8 a.m.

2. Total time spent ---------- No. of Structure ------ No. of persons----------

NAME OF THE SPECIES	INDOOR				OUTDOOR	
	HD	CS	MD	PMHD	Vegetation/Fence	PMHD

HD= Human dwelling CS = Cattle sheds MD = Mixed dwelling

PMHD = Per man hour density = No. of mosquito caught

No. of person X Time in hour

C. **ABDOMINAL CONDITION**

NAME OF THE SPECIES	UF	FF	SG	G	TOTAL

UF = Unfed FF= Full fed SG = Semi Gravid G= Gravid

Remarks if any ----------

Signature of Investigator

(Name & Designation)

FORMAT FOR MONITORING OF INSECTICIDE SUSCEPTIBILITY STATUS OF JAPANESEENCEPHALITIS VECTOR MOSQUITOES

(ADULT / LARVAL STAGE)

State----------Zone----------District ----------PHC----------

1) Date of test----------

2) Species tested----------

3) Insecticide tested Name of insecticide ----------
Concentration ----------

4) Test sample --------- Source of Collection ..... Physiological stage UF/FF/SG

5) Test Results

	REPLICATE –I		REPLICATE –II		REPLICATE -III	
Test group	**Test**	**Control**	**Test**	**Control**	**Test**	**Control**
No. exposed						
No. dead						
% Mortality						
Most corrected						

UF= Unfed FF = Full fed SG = Semi Gravid G = Gravid

6) Temperature:

7) Humidity:

Signature of the investigator
(Name & Designation)

OUTBREAK INVESTIGATION REPORT **AESF-10**

General information

State : .....

District: .....

PHC/Town: .....

Village /Ward:.....

Population: .....

Background information

Person reporting the outbreak:.....

Date of report .....

Date when investigations started.....

Person (s) investigating the outbreak.....

Details of investigation

Describe how cases were found (may include) a) house to house search in the affected area; (b) visiting blocks adjacent to the affected area; (c) conducting record reviews at local hospitals; (d) requesting health workers to report similar cases in their areas etc.

Descriptive epidemiology

Cases by time, place and person (attach summary tables and relevant graphs and maps)
Age specific attack rates and mortality rates

High risk age groups and geographical areas

Vaccination status of cases, unaffected population

Prevalence and density of JE vectors

Prevalence of reservoirs specially pigs

Description of control measures

_____

_____

_____

Description of measures for follow-up visits

_____

_____

_____

Brief description of problem encountered

_____

_____

_____

Factors which contributed to the outbreak

_____

_____

_____

Conclusions and recommendations

_____

_____

_____

Date:

Signature
(Name & Designation)